



**STS CONSULTANTS, LTD.**

**Supplemental Site Investigation  
Sampling and Analysis Work Plan  
Former Coke Plant  
Tecumseh Redevelopment, Inc.**

RCRA Docket No R3013-5-03-002  
Site EPA ID No. IND 005 462 601

Tecumseh Redevelopment, Inc.  
East Chicago, IN

STS Project No. 1-08741FF

US EPA RECORDS CENTER REGION 5



1004186





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

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September 11, 2007

REPLY TO THE ATTENTION OF:

Keith Nagel  
Manager, Environmental Affairs  
ISG International Steel Group  
3250 Interstate Drive  
Richfield, Ohio 44286-9000

Re: In the Matter of ISG Indiana Harbor Inc. and Tecumseh Redevelopment Inc.  
Supplemental Sampling & Analysis Work Plan  
Former Coke Plant

Dear Mr. Nagel:

We have completed a cursory review of your June 2007 Supplemental Site Investigation Sampling & Analysis Work Plan for the Former Coke Plant. Due to outstanding issues as indicated to you in our August 2, 2007 correspondence, we are providing you with a brief summary of our findings. We plan to provide a detail review of this supplemental Work Plan in conjunction with information that you are required to submit in response to our August 2, 2007 correspondence. Additional technical comments and recommendations may be provided at a later date. Described in the Attachment, are some of the discrepancies noted in the Supplemental Work Plan. These discrepancies should be addressed in the Supplemental Work Plan.

If you have any further questions or concerns please contact me at (312) 886-7954.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathan Adenuga".

Jonathan Adenuga  
U.S. EPA Project Manager

Enclosure

cc: Dale Papajcik, Esq., Squire, Sanders & Dempsey LLP  
bcc: Christine Liszewski

## **ATTACHMENT**

### **TECHNICAL REVIEW Supplemental Site Investigation Sampling and Analysis Work Plan Former Coke Plant**

### **ISG INDIANA HARBOR AND TECUMSEH REDEVELOPMENT, INC. EAST CHICAGO, INDIANA**

#### **4. 1. 5 Develop the Analytical Approach, Pg. 4-5, Para. 1**

Text states "If there is a single DQO exceedance or sporadic exceedances across the site..." This statement is very unclear. Apparently, this Supplemental Work Plan was designed to provide additional data points. Therefore, any data collected during these investigations should supplement existing data. Therefore, there should be enough information collected for use in the statistical analysis. If not, additional data should be collected for any statistical analysis that is deemed necessary to complete the evaluation.

#### **4. 1. 6, Specifying Performance or Acceptance Criteria**

It is unclear what is meant by "best" estimate of conditions. As you stated, the primary objectives of the Supplemental Work Plan is to further evaluate groundwater and establish the extent of impacts previously identified. Therefore, all data collected from these investigations should provide accurate representation and not estimates.

#### **4.1.7, The Plan for Obtaining Data**

The text described areas to be most likely impacted from the coking operations. However, it is not clear from the text that the Supplemental Work Plan was designed specifically for collecting samples from these likely impacted areas. If so, explain why the proposed sample locations do not reflect these likely impacted areas as you indicate on the map.

#### **6.3.3, Surface Water Levels**

The text proposes to measure surface water levels in the Canal, but did explain how these measurements would be used. Explain how these surface water levels would be used and if samples would be collected and analyzed.

### **CERTIFICATION**

I certify that the information contained in or accompanying this submission is true, accurate, and complete [to the best of our knowledge].

---

Keith Nagel  
Director, Environmental Affairs and Real Estate  
Tecumseh Redevelopment, Inc.



**Table of Contents**

<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Project Background .....	1
1.2 Objectives of the Supplemental Site Investigation Sampling and Analysis .....	2
<b>2.0 BACKGROUND .....</b>	<b>1</b>
2.1 Prior Manufacturing Operations.....	1
2.1.1 Sampling and Analysis Prior to the RCRA 3013 Order.....	2
2.2 RCRA 3013 Investigation Results .....	3
2.2.1 Soil Sample Results .....	3
2.2.2 Groundwater Sample Results .....	4
<b>3.0 PHYSICAL SETTING .....</b>	<b>1</b>
3.1 Topography.....	1
3.2 Hydrology.....	1
3.2.1 Surface Water .....	1
3.2.2 Lake Michigan Levels.....	2
3.2.3 Meteorology.....	2
3.3 Geology.....	3
3.3.1 Regional Geology.....	3
3.3.2 Site-Specific Geology .....	3
3.3.3 Regional Hydrogeology .....	3
3.4.2 Site-Specific Hydrogeology .....	4
<b>4.0 SAMPLING APPROACH.....</b>	<b>1</b>
4.1 Data Quality Objectives .....	1
4.1.1 State the Problem .....	1
4.1.2 Identifying the Decision .....	1
4.1.3 Identifying Inputs to the Decision .....	2
4.1.4 Defining the Boundaries of the Study .....	2
4.1.5 Develop the Analytic Approach .....	3
4.1.6 Specifying Performance or Acceptance Criteria .....	4
4.1.7 The Plan for Obtaining Data.....	4
<b>5.0 SAMPLE LOCATIONS AND RATIONALE .....</b>	<b>1</b>
5.1 Groundwater Sampling .....	1
5.2 Soil Sampling.....	2
<b>6.0 METHODS AND PROCEDURES .....</b>	<b>1</b>



6.1 Slag-fill/Soil Sampling Procedures .....	1
6.2 Monitoring Well Installation and Development .....	1
6.3 Groundwater Measurement Procedures .....	3
6.3.1 Monitoring Well Location Surveying.....	3
6.3.2 Groundwater Levels .....	3
6.3.3 Surface Water Levels .....	4
6.3.4 Hydraulic Conductivity Testing.....	4
6.4 Groundwater Sample Procedures .....	5
6.4.1 Project-Specific Analytical Considerations.....	7
6.5 Quality Control Procedures .....	8
6.6 Decontamination Procedures .....	9
6.7 Calibration and Maintenance Procedures .....	9
6.8 Data Validation .....	9
6.9 Internal Quality Control Checks, Audits, and QC Corrective Measures.....	11
6.10 Calculation of Data Statistics .....	11
<b>7.0 REPORTS .....</b>	<b>1</b>
<b>8.0 SCHEDULE FOR IMPLEMENTATION .....</b>	<b>1</b>
<b>9.0 REFERENCES.....</b>	<b>1</b>

#### **Tables**

Table 4-1A – Analyte List for Slag-Fill/Soil
Table 4-1B – Analyte List for Groundwater
Table 5-1 – Monitoring Well and Piezometer Information Summary
Table 5-2 – Planned Groundwater Sample Summary
Table 5-3 – Planned Slag-fill/Soil Sample Summary
Table 8-1 – Project Schedule

#### **Figures**

Figure 1-1 – Location Map
Figure 1-2 – USGS Topographic Map
Figure 4-1 – Investigation Decision Flow Chart
Figure 5-1 – Site Layout and Proposed Sample Locations

#### **Appendices**

Appendix A – Lake Michigan Water Level Graph, 1960-2007
Appendix B – USGS Hobart Precipitation Station Data, 2006- 2007

## 1.0 INTRODUCTION

The former Coke Plant property (Site) was once part of a larger steel making complex. The former Coke Plant property is now owned by Tecumseh Redevelopment, Inc. (Tecumseh) and is designated for industrial redevelopment. The site is located at 3001 Dickey Road in East Chicago, Lake County, Indiana. The location can be further described as in Township 37 North, Range 9 West, Section 16. This former Coke Plant property is shown on Figure 1-1 Location Map and Figure 1-2 Layout Map.

### 1.1 Project Background

On October 23, 2003, the United States Environmental Protection Agency (US EPA) issued a RCRA Section 3013 Administrative Order (US EPA Docket No. R 3013-5-03-002) to ISG-Indiana Harbor and Tecumseh. The Order demanded both parties to prepare a proposal for monitoring, testing, analysis, and reporting to ascertain the nature and extent of hazards posed by hazardous wastes that are present or may have been released at 14 identified Units and one Area of Concern (AOC) at the facility. ISG-IH and Tecumseh do not have information that indicates that hazardous wastes regulated by US EPA or the Indiana Department of Environmental Management (IDEM) are present or have been released at any of the 14 Units or the one AOC identified in the Order.

The Proposal for monitoring, testing, analysis, and reporting was contained in four work plans and a quality assurance project plan as follows:

- *Soil Sampling and Analysis Work Plan*, Volume 1 of 5, (Revision 2);
- *Sediment Sampling and Analysis Work Plan*, Volume 2 of 5, (Revision 2);
- *Hydrogeologic Conditions Work Plan*, Volume 3 of 5 (Revision 2);
- *Groundwater Sampling and Analysis Work Plan*, Volume 4 of 5, (Revision 2); and
- *Quality Assurance Project Plan*, Volume 5 of 5, (Revision 2)

These plans were prepared and subsequently approved by the US EPA on May 12, 2005. Field implementation of the work plans began shortly after US EPA approval. Soil boring advancement and the installation of groundwater monitoring wells occurred between March 14, 2005 and May 6, 2005. A second phase of well installations was completed in November 2005 with

groundwater monitoring conducted at these wells as well as select existing wells in May 2006. The results of the work conducted under the approved work plans were presented in four reports:

- *Soil Sampling and Analysis Report* (Volume 1);
- *Sediment Sampling and Analysis Report* (Volume 2);
- *Hydrogeologic Conditions Report* (Volume 3); and
- *Groundwater Sampling and Analysis Report* (Volume 4).

Data presented in these four reports for the former coke plant were used in the preparation of this work plan. The pertinent results are discussed in Section 2.

### **1.2 Objectives of the Supplemental Site Investigation Sampling and Analysis**

The primary purpose of the Supplemental Site Investigation at the former Coke Plant is to further evaluate groundwater and establish the extent of impacts previously identified. The objectives of the supplemental site investigation sampling and analysis plan are to:

- Evaluate the groundwater quality, further refine hydrogeologic conditions and identify the limits or extent of impacted groundwater at the down gradient side (east side) of the former Coke Plant property;
- Compare the results of analyses to human health and environmental risk criteria using the Indiana Department of Environmental Management (IDEM) Risk Integrated System of Closure (RISC) technical guide; and,
- Identify and evaluate what (if any) remedial measures may be required to mitigate the adverse groundwater impacts.

## **2.0 BACKGROUND**

The ISG Indiana Harbor, Inc. (ISG-IH) and adjacent Tecumseh properties are located at 3001 Dickey Road in East Chicago, Lake County, Indiana. The properties consist of approximately 1,200 acres of land along the southern shore of Lake Michigan and the Indiana Harbor Ship Canal. The operations have been producing steel since the 1920s, with the earliest operations occupying the mainland areas of the property.

The steel making complex originally opened in the early 1920s as the Mark Steel Company. It was later operated by Youngstown Sheet and Tube Company (Youngstown, Pennsylvania), Jones and Laughlin Steel Corporation (Pittsburg, Pennsylvania), and LTV Steel (Cleveland Ohio). In April of 2002 International Steel Group, Inc. was formed and acquired the majority of the former LTV Indiana Harbor Works facility. The remaining portions of the former LTV Indiana Harbor Works facility were acquired by Tecumseh. Subsequently the ISG and Tecumseh properties were acquired by Mittal Steel USA. Figure 1-1 provides a location map.

### **2.1 Prior Manufacturing Operations**

The location of former Coke Plant No. 1 (coke plant) is inland from the peninsula, along the Indiana Harbor Ship Canal just south of the main east-west railroad corridor. The coke plant encompassed approximately 50 acres which was developed in the early 1920's with two coke ovens and an ancillary byproduct recovery system. Later, in the 1960's two additional coke ovens were constructed and one of the original two was razed. The coke plant operations ceased in April 1982 and the aboveground portions of the former coke plant buildings and structures were demolished in early 1990s. The coal bin on the west side of the facility was filled with slag to produce a level surface. Process sewers and underground piping were also capped and/or decommissioned as part of the demolition process. The former Coke Plant is currently sparsely covered with low lying vegetation (i.e. predominantly grasses) and fenced with a lock and gate to prevent access by employees or trespassers.

Production of coke from coal produces byproducts which were reclaimed and used in other steel production facilities or sold for commercial value. These byproducts included benzol (light oil), ammonium salts, phenol and naphthalene. Tar was also recovered and stored in holding tanks until it was sold or used for fuel. Coke oven gas was recycled to the coke ovens and to other

steel mill facilities for use in reheat furnaces. Approximately 40% of the coke gas was returned to the coke ovens and used for heat production.

### **2.1.1 Sampling and Analysis Prior to the RCRA 3013 Order**

On July 11 and 12, 2000, Techlaw Inc., a contractor of US EPA, collected samples from the former Coke Plant. The groundwater samples were collected by a direct-push drilling rig that was used to penetrate the water table, which occurred at a depth of about six feet below the ground surface. Dedicated tubing was used at each sampling location to minimize the possibility of cross-contamination. In between each sampling location, the well screen was decontaminated with an Alconox solution and distilled water rinse. Samples were collected through dedicated tubing without filtering. Although turbidity was not measured, the unfiltered grab samples from the temporary well-points likely had high levels of turbidity. Visual observations made by the Arthur D Little personnel (August 2000) indicated that the groundwater sample from GW-2 was particularly sediment-laden.

Analysis of the spilt samples of the groundwater indicated the presence of barium, cadmium, chromium, lead, silver, acenaphthene, and naphthalene at some locations. However, the presence of these constituents does not necessarily indicate a release of a hazardous waste. Cadmium (329 µg/L) was reported in the field blank, which was collected after sample GW-3; however, no SVOCs were detected in the blank. US EPA indicated in the RCRA Section 3013 Order that analytical results of groundwater samples analyzed by the US EPA from the area detected the presence of constituents including phenol, naphthalene, pyrene, fluorene, and several other organic compounds.

A review of the analytical data from the Arthur D. Little groundwater sample splits indicated that only concentrations for two constituents exceeded the US EPA Region 9 PRGs (cadmium at Wells GW No. 1, GW No. 4, and GW No. 6, and naphthalene at Wells GW No. 2 and GW No. 6). Thus, although several constituents were detected in the groundwater samples, the levels generally do not suggest widespread contamination based on a comparison to the US EPA Region 9 PRGs. A copy of the Arthur D. Little report is included as an appendix to the groundwater sampling and analysis work plan (STS, 2004).

## **2.2 RCRA 3013 Investigation Results**

The RCRA 3013 investigation work plan for the former coke plant area proposed the installation of five water table monitoring wells and three deep monitoring wells to confirm the constituents detected during the July 2000 investigation (Little, 2000). Subsequent to the July 2005 groundwater sampling event, a second group of six wells (three well pairs, shallow and deep at three locations), not proposed in the work plan, were installed in November of 2005. Based on the July 2005 groundwater monitoring data, the three well pair locations were installed up-gradient (to the west) and side-gradient (to the north and south) of the well pair MW-803S and MW-803D.

Soil samples were collected from the five initial well locations (MW-801 through MW-805). These samples were analyzed for VOCs, SVOCs, PAHs, 19 metals, cyanide, sulfide, total organic carbon and phenol. Groundwater samples were collected from the eight initial wells in July 2005 and from the six additional wells in May 2006. These samples were analyzed for the same compounds listed above for the soil plus alkalinity, chloride, ammonia and chemical oxygen demand. Groundwater samples were collected from the eight initial wells in May 2006 and were analyzed for VOCs. Two wells (MW-803S and MW-803D) were also analyzed for naphthalene, phenolics, ammonia and chloride.

The results of the laboratory analytical testing conducted are summarized in the sections below.

### **2.2.1 Soil Sample Results**

Soil samples were collected from the initial eight monitoring wells installed at the former coke plant (MW-801 through MW-805). Soil samples were collected from the near surface (0 to 2 feet bgs) and from the two foot interval above the water table (2 to 4 feet bgs or 3 to 5 feet bgs). Additionally, a sample was collected from the bottom two foot interval of the Calumet sand from the three deep monitoring wells (MW-801D, MW-803D and MW-805D).

Three metals and up to nine different PAH analytes were detected in slag-fill at the former coke plant. Two of the metals (hexavalent chromium in two samples and lead in a single sample) were above the migration to groundwater data quality objectives (DQOs), but were not detected in the groundwater. Thus, it was concluded that a release to groundwater of hexavalent chromium and/or lead at the former Coke Plant has not occurred. Arsenic was detected slightly above the

IDEM default closure criteria DQO for only one soil sample (22 mg/kg versus DQO of 20 mg/kg), but the average concentration for the area is well below the DQO. Thus, it is unlikely that an arsenic release has occurred at the former coke plant.

Three PAHs (benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene) exceeded the IDEM default closure DQO and direct contact screening value in surface slag-fill samples. In one location benzo(a)pyrene exceeded the construction worker screening criteria. Currently this area is fenced and the gate is locked, limiting access to the area so the opportunity for direct contact is limited. Additionally, the sample from MW-801S, with the highest PAH values detected in the surface sample, is within an area that was formerly used to store coal. It is likely that when the area was backfilled with slag, some of this material was incorporated into the fill. Thus, these PAH concentrations may be attributable to the presence of coal. Thus, it is indeterminate if these PAHs are actually associated with a release or just a reflection of the former coal storage at the former Coke Plant.

The remaining PAHs that were detected exceeded the migration to groundwater DQO. With one exception, these PAHs were not detected in the groundwater. The exception, phenanthrene, was detected in groundwater, but well below applicable groundwater DQOs.

### **2.2.2 Groundwater Sample Results**

A total of 14 monitoring wells were installed in the former Coke Plant area during two phases. Groundwater samples were collected from the original eight wells in July 2005 and at the newest six wells in May 2006. Split samples were collected and shared with the USEPA during both sampling events. Groundwater monitoring indicates that a limited number of analyte concentrations were above the DQO in the western half of the former coke plant. In general, the water quality of the western portion of the site does not indicate the presence of a release or significant impact on groundwater attributable to a RCRA hazardous waste.

Wells located on the eastern portion of the former Coke Plant indicated elevated concentrations of organic compounds. The organic constituents with the highest concentrations in the eastern portion of the site were 2,4-dimethylphenol, benzene and phenol. Thus, the focus of this work plan is to further evaluate these organic compounds detected in groundwater on the eastern side



of the former Coke Plant. In addition, the supplemental investigation will include two inorganic constituents, ammonia and chloride, which appear to have elevated concentrations.

### **3.0 PHYSICAL SETTING**

#### **3.1 Topography**

The former Coke Plant is located in the northwest portion of Lake County, Indiana on the shoreline of Lake Michigan. It is an area of low relief within the bed of ancient glacial Lake Chicago (ancestral Lake Michigan). Lake Chicago stood at an elevation of about 640 feet (Fullerton, 1980). Sediments deposited from Lake Chicago accumulated to form the relatively thin Lake Border sequence. Southerly lake currents carried large volumes of fine glacial sand into this area. Much of the sand was reworked into numerous, distinct, low dune-beach ridges.

In some areas there is as much as a 40 feet difference in elevation between the present shoreline of Lake Michigan and the relic shorelines. The relic shorelines are capped by sand dunes which trend in an East to West arc. The relic shoreline approximately coincides with the east-west trending railroad grade along the south end of the Peninsula.

Regionally, the ground surface is relatively flat and varies from +580 feet Mean Sea Level (MSL) to +590 feet MSL (Figure 3-1). The level of Lake Michigan varies from +580 feet MSL to +585 feet MSL. Locally, the groundwater elevation varies from 5 feet to 20 feet above the water level of Lake Michigan.

Two distinct land features are present at the steel making complex. This includes the made-land or Peninsula area and the urban fill covered beach deposit area. The made-land or Peninsula area is hereinafter referred to as the Peninsula, whereas the urban fill covered beach deposit area is hereinafter referred to as the landward portion of the complex. The Peninsula is bordered on two sides by Lake Michigan and one side by Indiana Harbor. The landward side of the Peninsula is bordered by the east-west trending railroad grade which is located approximately at the relic shoreline. The landward side is bordered to the north by the east-west trending railroad grade, the east by Indiana Harbor Canal, and to the west and southwest by the BP Whiting Oil Refinery. Urban/commercial facilities bordered the landward side to the southeast.

#### **3.2 Hydrology**

##### **3.2.1 Surface Water**

Regionally, surface water flow is towards Lake Michigan, Indiana Harbor and the Indiana Harbor Canal. The surface material at the former Coke Plant almost entirely consists of highly



permeable slag fill. Therefore, precipitation rapidly infiltrates into the slag fill. Groundwater flow for the Site is toward Indiana Harbor Canal based on water level information collected from monitoring wells installed in the initial investigation.

### **3.2.2 Lake Michigan Levels**

Although the flow in the Indiana Harbor Canal is typically toward Lake Michigan, if water levels in Lake Michigan rise relative to those in the canal, backwater effects and flow reversals can occur. With no other outlets, normal flow accumulates within the canal until equilibrium between the lake and canal levels is re-established. Flow reversals are typically short in duration, whereas backwater (gradient) effects on water levels can persist for longer periods of time.

In addition to long-term lake level fluctuations, seiches (temporary buildups of lake water near the shore caused by local atmospheric pressure and wind) can cause short-term fluctuations of more than 3 feet within a few hours along the southern lakeshore. Long-term water level changes in Lake Michigan immediately affect levels in parts of Indiana Harbor and the canal, but seiche fluctuations are not fully transported upstream. Short-term seiche fluctuations are damped by the interaction of surface water and groundwater.

Lake Michigan levels recorded (in feet mean sea level) between 1960 and 2006 show a record low of 576.05 occurring in March 1964 and a record high of 582.35 recorded in October 1986. The data for 2000-2006 indicate that Lake Michigan levels are on the low side of normal ranging from a low of 576.54 in March 2004 to a high of 578.64 in July 2004. The last recorded measurement obtained was for December 2006 with a level of 577.36. A copy of the Army Corps of Engineers graphs is included as Appendix A.

### **3.2.3 Meteorology**

The climate of northwestern Indiana is continental and is characterized by hot, humid summers and cold winters. The region receives an average of about 37 inches of precipitation and 20 inches of snowfall annually (National Oceanic and Atmospheric Administration, 1992).

The nearest USGS precipitation recording station is located at Hobart, Indiana approximately 13 miles southeast of the site. The data for June 2006 to May 2007 has been provided on a graph and a table included in Appendix B. The total precipitation for the year was 71.4 inches with the

greatest amount falling in October 2006 (11.48 inches) and December 2006 (11.28 inches). The least amount of precipitation (1.16) was recorded for the month (full month data) of September 2006.

### **3.3 Geology**

#### **3.3.1 Regional Geology**

The former Coke Plant are located within the northwestern part of the Calumet Lacustrine Plain. The geology of the northwestern part of the Calumet Lacustrine Plain consists of glacial and post glacial deposits over bedrock. The uppermost materials are unconsolidated slag-fill and native deposits (predominately Calumet sands). Slag-fill, consisting mainly of sand and gravel size materials, has been deposited over the natural sands. Below the Calumet sands are sediments of glacial and lacustrine origin that are referred to as the glacial clay till/lacustrine clay or clay unit. Silurian bedrock is found below the clay unit.

The slag-fill thickness increases across the Peninsula from the relic shoreline toward the lake. The top of the Calumet sand and the top of the clay slope downward toward the lake. The thinning of the Calumet sand with increasing distance from the relic shoreline is consistent with normal near-shore environments in lakes.

#### **3.3.2 Site-Specific Geology**

The slag-fill encountered on both the landward portion of the area of interest and on the Peninsula can be characterized as a granular material that ranges from fine sand to coarse gravel in size and from brown to black in color. The slag is medium dense to extremely dense as measured by standard penetration tests during drilling. The slag fill varies in thickness from one to four feet, except in the vicinity of the former coal storage area where its thickness is estimated to be approximately 12 to 15 feet. Below the slag-fill is approximately 33 to 40 feet of fine to medium sand and silty sand. At MW-803D the lower four feet of the Calumet aquifer consisted of dense silt. Clay is encountered below the sand.

#### **3.3.3 Regional Hydrogeology**

The regional hydrogeology includes a shallow Quaternary-age aquifer referred to as the Calumet Aquifer and Cambrian and Ordovician aquifers in bedrock. No known hydraulic connections between the Calumet Aquifer and the underlying bedrock aquifers are documented. The Calumet

aquifer is a beach deposit consisting of eolian and water-laid fine sands (with some silt). The Calumet Aquifer is underlain by an aquitard comprised of low permeability clay and till.

### **3.4.2 Site-Specific Hydrogeology**

The Calumet Aquifer is a water table or unconfined aquifer with a saturated thickness of approximately 33 feet (MW-801D) at the former coke plant. The water table is generally encountered at elevation 582 to 587 feet MSL. This corresponds to a water depth of 5 to 10 feet below ground surface (bgs). Groundwater flow is east to southeastward toward the Indiana Harbor Canal.

Horizontal hydraulic gradients ranged from 0.0022 feet per foot to 0.0028 feet per foot as calculated along two low paths (MW-804S to MW-803S and MW-805S to MW-802S) in the direction of flow. Vertical hydraulic gradients ranged from 0.001 to 0.04 feet per foot downward.

The hydraulic conductivity in the water table wells completed in the upper portion of the Calumet aquifer at the coke plant is  $2.5 \times 10^{-2}$  cm/sec. The hydraulic conductivity in deep wells completed in the lowest portion of the Calumet sand is  $9.6 \times 10^{-4}$  cm/sec. Groundwater flow is variable and ranges from 220 to 290 feet/year.

#### **4.0 SAMPLING APPROACH**

The sampling approach proposed in this work plan is a judgmental (or authoritative) sampling approach for the following reasons:

- The sample locations will be selected using previously collected data to fill data gaps.
- The potential source areas contributing to groundwater impacts are known.
- The area of impact is dictated by known contaminant constituents and groundwater flow characteristics.
- Not all areas within the Coke Plant property are suspect source areas.

#### **4.1 Data Quality Objectives**

The DQO process is a series of planning steps designed to ensure that the type, quality, and quantity of environmental data used in decision-making are appropriate for the intended application.

The DQO process allows decision-makers to define their data requirements and acceptable levels of decision during planning before any data are collected. DQOs are based on the seven-step process described in US EPA Guidance for the Data Quality Objectives Process (August 2000) document. The general elements of the DQO process are presented in the various sections of the QAPP; however, for specificity for the proposed soils evaluation, each step of the DQO process is discussed in the following subsections.

##### **4.1.1 State the Problem**

The first step in the DQO process is to state the problem. Groundwater impacts by VOCs, SVOCs, PAHs, chlorides and ammonia have been identified in groundwater from monitoring wells located on the eastern side of the former coke plant.

##### **4.1.2 Identifying the Decision**

The purpose of the proposed supplemental site investigation is to identify the extent of groundwater impacts identified on the east side of the former coke plant. The results of the data collected will be used to answer the following questions:

- Is the extent of groundwater impact defined?
- Does the magnitude of the impacts warrant remedial action?

#### **4.1.3 Identifying Inputs to the Decision**

Inputs into the decision will include the collection of both analytical and physical data. Groundwater samples will be collected from newly installed and existing monitoring wells and analyzed at a certified laboratory for specific analytes. Reported analyte concentrations will be compared to generic criteria documented in the Default Closure Tables in Appendix 1 of the Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) technical guidance (2001 with the May 31, 2006 updated table). These generic criteria will be the project's DQOs and are depicted on Table 4-1 with the proposed analytes for this project. Physical data will include the measurement of the depth to groundwater and hydraulic conductivity testing from new and existing monitoring wells.

Laboratory analytical data will be performed using Level IV QA/QC reporting by the laboratory. The laboratory will report the results of the analysis to the method detection limit. The reported concentration values which occur between the method detection limit and the reporting limit (also known as the quantification limit) will be qualified as estimated concentrations.

#### **4.1.4 Defining the Boundaries of the Study**

The boundary of the study refers to both spatial and temporal boundaries. A Layout Map (Figure 2) is included with this plan. The figure depicts the locations of the existing wells as well as proposed well locations. Well locations are restricted by physical features not readily apparent to observations at the surface. Subsurface features that interfere with placement of well locations include:

- Underground utilities. Many utilities, water, fire water, gas service lines, sanitary sewer, storm sewer are present across the former coke plant. Some utility lines were capped because they served only the coke plant. Other utility lines continue to serve other facilities on either side (northeast and southwest) of the coke plant.
- Former foundations. Some of the larger buildings were completed below grade and after the equipment was removed, demolition debris from the building was used to fill the voids. Additionally, the former foundations remain in place. These features provide both a barrier to advancing a well as well as providing biased data when evaluating hydrogeologic conditions if a well is able to be installed through the materials.

- Sheet pile wall tiebacks. Information regarding the construction of the sheet pile wall and locations (depth and length) of the tie-backs is not clearly documented. Care will be used during drilling near the sheet pile wall to avoid the tie-backs.

Therefore, areas of old foundations and underground utilities will be avoided during soil sampling or monitoring well installation. If buried obstructions are encountered during drilling the sampling/well locations will be moved incrementally so that the sampling/well location is as near to its original location as possible.

The units that will be used for decision making will be the discrete groundwater samples. No one individual sample will be weighted greater than any other individual samples. Each sample will be evaluated from a risk perspective.

The temporal boundaries of the decision are the single sampling events. Phased activities will be based on the results of earlier phases. Routine or long term monitoring is not considered appropriate at this point in the evaluation. Practical constraints such as meteorological conditions, site access, time and availability of personnel or equipment will be adjusted to accommodate the needs of the field personnel so that sample collection using project SOPs can be accomplished with minimum deviation.

#### **4.1.5 Develop the Analytic Approach**

The decision rule is depicted on Figure 4-1 the Investigation Decision Flow Chart for the Supplemental Site Investigation. Analytical results will first be compared to project DQOs. If project DQOs are exceeded, then an evaluation of the data will be performed to identify if the extent of impact has been defined.

If the extent of impact is defined and a sufficient number of samples have been collected, then the data will be analyzed statistically. If the statistical evaluation indicates that DQO exceedances need to be addressed, then potential response actions to the exceedances will be evaluated. If DQOs are not exceeded or the statistical evaluation indicates no DQO exceedances within a specific confidence interval, then no further action will be necessary.



If there is a single DQO exceedance or sporadic DQO exceedances across the site for which a statistical analysis cannot be performed, then the risk associated with the exceedance will be evaluated qualitatively. If sufficient risks are identified, potential response actions may be evaluated. If little or no risk is present, no further action will be appropriate.

#### **4.1.6 Specifying Performance or Acceptance Criteria**

The overall goal of the supplemental site investigation work plan is to further evaluate groundwater quality at the former coke plant. Because of the limitations inherent in any monitoring program, the results of any investigation phase may represent only an estimate of the "true" conditions. In any investigation, there is a risk of making a decision error. On this project, a decision error could greatly affect the overall project costs. Since it would be impossible to completely avoid any decision error with 100% certainty, the project investigation scope was designed to provide a "best" estimate of conditions while avoiding unnecessary monitoring and its associated cost.

#### **4.1.7 The Plan for Obtaining Data**

The size of the former coke plant, its former facility layout and use of the property do not favor the use of random sampling techniques so that statistics can be applied to make numerical estimates of sample concentration populations. Much of the area of the former coke plant was used for either coke storage (southwest side of the site) or railroad tracks for hauling coal (around the perimeter and along the northeast side of the site). The railroad tracks are much less likely to be contaminated. Similarly, the area directly beneath the former coke ovens is less likely to be impacted because of the absence of by-products. The areas most likely to be impacted are the piping runs and by-products recovery areas. However, the exact locations of these former features cannot be ascertained in the field because the facilities have been razed and few landmarks are present nor are scaled Site drawings available.

A disadvantage of random sampling in former industrial areas is that when random sample locations are generated the locations can occur on obstructions or barriers. In this case, the sample location must be moved during sampling, often without the ability to generate a new "random" location.

In areas where impacts have been identified and the extent of impact is to be defined, random sampling is inappropriate. Therefore, for the coke plant, sample locations will be selected using judgmental sampling so that the extent of impact can be defined. Locations have been selected to evaluate the extent of known groundwater impacts. Measurements will be made to evaluate if and where impacts may be migrating.

## **5.0 SAMPLE LOCATIONS AND RATIONALE**

The sample locations for the supplemental site investigation are depicted on Figure 5-1 and the rationale for the sample locations are presented below. Existing and planned monitoring well locations are listed on Table 5-1. Previous sampling events at the former coke plant have been conducted using a larger list of constituents. Based on the prior results, select constituents are proposed during this supplemental site investigation. A list of proposed samples and the proposed analyses by sample location are shown on Tables 5-2 and 5-3.

### **5.1 Groundwater Sampling**

Ten water table monitoring wells, five deep monitoring wells and two piezometers (water level measuring points) will be installed at the former coke plant area in the locations depicted on Figure 5-1. Four pairs of wells (water table and deep wells) will be advanced along the canal side of the property to evaluate the down gradient area of the property. Four water table wells and two piezometers will be placed to the west of the paired wells, within the former coal storage bin to evaluate both groundwater quality and the hydraulic connection between the coal bin and the portion of the coke plant to the northeast. Two additional well pairs will be advanced northeast and northwest of MW-807S&D to evaluate the extent of impacts up gradient to MW-807S&D.

Analytes proposed for the existing wells are shown on Table 5-2. The VOC list will be those analytes required under the US EPA RCRA 3013 order as used in the initial investigation at the coke plant. PAHs and two SVOCs, phenol and 2,4-dimethylphenol, will be analyzed from groundwater at select wells where previous sample results indicated an exceedance or potential to exceed a DQO. The list of metals includes antimony, arsenic, calcium, iron, magnesium, manganese, potassium, and sodium. The general chemistry parameters include bicarbonate alkalinity, chloride, and sulfate. The groundwater samples will also be analyzed for ammonia.

Analytes proposed for all new wells will be the full list of analytes as shown on Table 4-1 for the initial round of sampling. Supplemental sample events may use some or all of the proposed analytes shown on Table 5-2 for the existing wells.

Piezometers will not be sampled for groundwater quality. The locations of the piezometers have been chosen to provide additional information about the groundwater elevations within the former

coal bin. The purpose of the piezometers is to evaluate the subsurface material in former coal bin and observe water level changes.

## **5.2 Soil Sampling**

Soil sampling for visual classification and PID screening will be performed at each boring location. Soil sampling, if conducted, would occur if field observations (olfactory, visual or field instrument readings) indicate a potential for impact. At each well location, soil samples will be collected for laboratory analysis if elevated PID readings or visual impacted soil are observed in the vadose zone. Additionally, a sample of the slag-fill/soil in the screened interval of the deep monitoring wells may be analyzed if field observations suggest a potential for impact. Samples will be analyzed for the analytes as listed on Table 5-3.



## **6.0 METHODS AND PROCEDURES**

The methods and procedures for soil sample collection are described in the QAPP and field procedures F101, F102 and F103. Surface slag-fill samples will include the interval from the ground surface to two feet bgs. Subsurface slag-fill or soil samples will include any samples collected from two feet or greater in depth bgs.

The methods and procedures for installing, constructing and developing monitoring wells are described in the QAPP and field procedures F101 through F103. Groundwater samples will be collected in general conformance with field procedures F104 and F301 through F304. Monitoring well elevations will be surveyed using standard surveying techniques (field procedure F801).

### **6.1 Slag-fill/Soil Sampling Procedures**

Slag-fill/soil samples for visual classification and screening will be collected in general conformance with the field procedures described in the QAPP using conventional boring equipment.

Soil samples will be field-screened using a PID. Field measured parameters will include PID readings. The meter will be used and calibrated in general conformance with Field Procedure F203 included in the QAPP. The field screening will be conducted in general conformance with Field Procedure F205. Soil sampling for laboratory analysis will be conducted if elevated PID readings or field observations indicate a potential for impact.

All sampling equipment will be decontaminated in accordance with procedures specified in Section 6.6.

All wastes generated during sampling, including decontamination liquids and other debris, will be handling in accordance with the procedures specified in Field Procedure 504.

### **6.2 Monitoring Well Installation and Development**

Soil borings will be drilled at each well location prior to groundwater monitoring well installation. Borings will be advanced using either hollow stem augers or rotary drilling techniques. Rotary drilling techniques may include mud or water as a drilling fluid and will be used as needed in



areas of heaving sands (sand under hydrostatic pressure). The drilling techniques are described in Section 4.10.2 of the QAPP.

A monitoring well will be constructed inside the drill string after the desired total depth of the well has been reached. Water table monitoring wells will be constructed with a ten-foot long well screen to intersect the water table (approximately two feet of screen above the water table and eight feet below pending adequate depth to water to permit proper sealing of the well). Deep monitoring wells will be constructed with a three-foot long well screen. The wells will be constructed with new PVC casing and well screen, two-inches in diameter. The well screen will be factory cut slot at 0.010-inch per slot. The filter pack will extend one to two feet above the top of the screen and a one-foot fine sand seal will be placed above the filter pack. The remaining annular space will be sealed with coarse, chipped bentonite to within one-foot of the surface. A protective pipe and concrete surface seal will complete the installation. At locations where the water table is less than six feet, professional judgment will be used in the field to position the screen and adjust the filter pack and filter pack seal thicknesses to install the water table monitoring wells.

Piezometers (observation wells for groundwater level measurements only) will be constructed in a soil boring advanced as described above. The piezometer will consist of one-inch diameter slotted and solid PVC pipe. The slotted portion of the pipe will extend approximately one to two feet above the apparent water table and the annular space around the slotted portion will be backfilled with filter pack sand. The remainder of the borehole interval will be completed with solid pipe and bentonite backfill. A cover pipe may be used for protection.

Monitoring wells will be developed after the well is installed by surging and purging the well until the development water clears, five well volumes of groundwater have been removed, or field parameters have stabilized. Further details regarding well development are included in Field Procedure F103, Monitoring Well Installation, in Section 5.4.

Borehole lithology and well construction details will be provided on a bore log and well construction diagram. This documentation will be included in the report of the supplemental site investigation.

### **6.3 Groundwater Measurement Procedures**

Groundwater measurement procedures will be conducted in general conformance with the field procedures described in the QAPP. The specific measurements that will be collected are described below.

#### **6.3.1 Monitoring Well Location Surveying**

Monitoring well locations will be field located several days before sample collection activities to permit clearance of utilities by Mittal personnel. After the monitoring wells have been installed, the locations and well casing elevations will be obtained using standard surveying techniques in general conformance with field procedure F801.

The methods and procedures for installing, constructing and developing monitoring wells is described in the QAPP and field procedures F101 through F103. Groundwater samples will be collected in general conformance with field procedures F104 and F301 through F304.

#### **6.3.2 Groundwater Levels**

Water levels in groundwater monitoring wells and piezometers will be measured from the permanent point indicated at the top of the inner casing (the surveyed elevation point, as marked by the surveyor), unless otherwise specified, using an electronic water level measuring device (water level indicator). The point of measurement will be documented in the field logbook if different from the top of the inner casing. The reason for deviating from the measurement point should also be noted.

Water levels are measured by lowering the probe into the well until the device indicates that water has been encountered, usually with either a constant buzz, or a light, or both. The water level is recorded to the nearest one-hundredth-foot (0.01) using the graduated markings on the water level indicator cord. This measurement, when subtracted from the measuring point elevation, yields the groundwater elevation.

Groundwater levels will be measured to the nearest 0.01 foot. However, reporting of water level elevations depends on the accuracy of the vertical control (typically either 0.1 or 0.01 foot).

Groundwater elevation may be measured at times other than groundwater sampling events to evaluate seasonal or weather-related influences on groundwater levels. Groundwater level measurements will be reported.

#### **6.3.3 Surface Water Levels**

Surface water levels in the canal will be measured from a surveyed accessible location along the canal sheet pile wall at the two locations depicted on Figure 5-1. A depth to water of the canal will be taken during each groundwater measuring event.

Surface water levels will be measured to the nearest 0.01 foot. However, reporting of water level elevations depends on the accuracy of the vertical control (typically either 0.1 or 0.01 foot).

#### **6.3.4 Hydraulic Conductivity Testing**

Hydraulic conductivity testing will be conducted on four water table and four deep monitoring wells for comparison to the hydraulic conductivity measurements made in existing wells.

The rising head method will be used to evaluate the hydraulic conductivity in both the shallow and the deep wells. The rising-head test imposes a stress on the water bearing layer by instantaneously depressing the water surface and measuring the rate of water level recovery to equilibrium conditions. The water level will be depressed by extracting a volume of water (e.g. removing a full bailer) or by using a pneumatic well manifold and inert nitrogen gas. The rate of water recovery will be measured using a pressure transducer and data logger.

The pressure transducer will be submerged in the water to record the water level recovery to the static level. Pressure gages will be used to record the pressure of the well manifold and of nitrogen supply tank. This method will be used for the deep wells because the water level within the well casing is significantly higher than the screen. One to three replicate tests will be conducted on each monitoring well tested.

Hydraulic conductivity values for each well will be calculated using the Bouwer and Rice method (1976) in a readily available computer program (Aquifer Test Version 2.5 by Waterloo Hydrogeologic).



#### **6.4 Groundwater Sample Procedures**

Groundwater samples will be collected in general conformance with the field procedures described in the QAPP. Prior to sampling, the water level in each well will be measured. Groundwater samples will be collected for laboratory analysis for the analytes as shown on Table 5-2.

Field measured parameters will include pH, oxidation reduction potential (ORP), temperature and conductivity. These parameters will be measured at each monitoring well for each monitoring event. Groundwater with pH values greater than 11 will have their pH re-tested in the laboratory using a low sodium error glass electrode.

Groundwater samples will be collected using a non-dedicated bladder pump with disposable bladders and/or peristaltic pump. For bladder pumps, the general sampling procedure will include a change of bladders between each well. Non-disposal pump parts will be decontaminated in general conformance with Section 6.6. The procedure used to sample each well with the bladder pump will include the following steps.

1. Cover the area around the base of the well with plastic to protect the sampling equipment from surface soil contamination.
2. Open the well and permit the water level to equilibrate to atmospheric pressure.
3. Set up and assemble the pump; measure the appropriate length of disposal sample tubing.
4. Set up the flow-through cell to measure groundwater field parameters and calibrate the measurement equipment (pH, temperature, conductivity, ORP, and turbidity)
5. Measure the depth to groundwater.
6. Lower the pump into the well and position the well intake. For the water table wells the pump intake will be placed at the center of the saturated interval with the bottom of the pump at least 1.5 feet above the bottom of the well and with at least three feet of water over the top of the pump (minimum head requirement). For the deep wells the bottom of the pump will be placed approximately 1.5 feet above the bottom of the well which places the pump intake near the top of the screened interval.
7. Turn on the pump and begin purging at a flow rate such that the water level of the well remains near its static water level. This will prevent cascading of the water down the well screen, so that aeration of the water sample should not occur. The flow rates are anticipated

to be 100 to 500 milliliters per minute (ml/min). Wells with lower transmissivity will be purged and sampled at a lower flow rates (300 ml/min or less)

8. Document the measured field parameters, pump rate and groundwater level every three minutes. When three consecutive readings are within 10% of each other, the well will be considered ready for sampling.
9. Conduct sampling by filling each laboratory-supplied, pre-preserved container in the following order: VOCs, SVOCs, PAHs, TOC, other inorganic parameters, total metals and lastly dissolved metals. The samples will be field filtered for dissolved metal analysis.

The procedures to be used to sample wells with the peristaltic pump include the following steps:

1. Cover the area around the base of the well with plastic to protect the sampling equipment from surface soil contamination.
2. Open the well and permit the water level to equilibrate to atmospheric pressure.
3. Set up and measure the appropriate length of new disposal sample tubing. Insert new silicone tubing into the pump head of the peristaltic pump.
4. Set up the flow-through cell to measure groundwater field parameters and calibrate the measurement equipment (pH, temperature, conductivity, ORP, and turbidity)
5. Measure the depth to groundwater.
6. Lower the disposable tubing into the well so that the bottom of the tubing will be at the approximate center of the saturated interval within the well.
7. Turn on the pump and begin purging at a flow rate such that the water level of the well remains near its static water level. This will prevent cascading of the water down the well screen, so that aeration of the water sample should not occur. The flow rates will be approximately 100 to 400 milliliters per minute (ml/min). Wells with lower transmissivity will be purged and sampled at a lower flow rates (300 ml/min or less)
8. Document the measured field parameters, pump rate and groundwater level every three minutes. When three consecutive readings are within 10% of each other, the well will be considered ready for sampling. If the well purges dry, groundwater sample collection will begin as soon as the well had recharged sufficiently to collect a sample. If non-aqueous phase fluids (free product) are present one to three well volumes will be purged prior to sampling as determined by the ability to obtain water below the free product without free product becoming incorporated into the sample. If the well produces water very slowly and could be purged dry groundwater will be sampled after the well recovers sufficiently to

resume pumping. In this case the field readings will be taken immediately before sampling and recorded on the field sampling sheet.

9. Conduct sampling by filling each laboratory-supplied, pre-preserved container in the following order: VOCs, SVOCs, PAHs, TOC, other inorganic parameters, total metals and lastly dissolved metals. The metal samples will be field filtered for dissolved metal analysis.

Sampling equipment will be decontaminated in accordance with procedures specified in Section 6.6.

Wastes generated during sampling, including purge water, decontamination liquids, and other debris, will be handled in accordance with Field Procedure F504.

#### **6.4.1 Project-Specific Analytical Considerations**

The groundwater found in contact with steel-making slag-fill may have some characteristics such as an elevated pH or high sulfide concentrations which may require modifications to some analytical methods with respect to both the preservation of the samples in the field and the extractions/analysis performed in the laboratory. The US EPA Region V QAPP guidance (April 1998) recommended some modifications to sampling and analysis based on Region V's experience with sampling at other steel mills. Some of the specific recommendations incorporated into this sampling and analysis plan include:

- Non-preservation of groundwater samples for VOCs. Since the pH is anticipated to be elevated, the elevated pH can act as a biocide. Elevated concentrations of calcium in the groundwater can react with acid, efflorescing and losing volatiles during the reaction. Thus, VOC samples will not be preserved with acid.
- The level of alkalinity will be measured in the groundwater. If the alkalinity is greater than 1,000 milligrams per liter, groundwater samples may not be preserved with nitric acid because it is better not to use more than 10 milliliters of acid to preserve the sample.
- The groundwater may have low dissolved oxygen and high pH and both sodium hydroxide and zinc acetate will be used for sulfide analysis.
- Samples for cyanide may not [need to] be preserved with sodium hydroxide if the pH of the groundwater is greater than 11 [because the sample is already at the required alkaline pH].

- The laboratory will use a reagent to check for sulfide interference prior to the cyanide analysis; and, if present, will modify the procedure to adjust for the interference.

## **6.5 Quality Control Procedures**

Quality Control (QC) for field instrument measurements are duplicate or replicate measurements taken at the time of the measurement. The field logbook or data recording sheet will serve as the quality assurance record for field instrument measurements.

QC samples for soil or groundwater samples will include field blanks (aqueous or when non-disposable equipment is used), trip blanks, field duplicates, and MS/MSD samples. These samples will be collected as described below:

Field blanks - Field blanks will be collected at a frequency of one field blank for every ten or less aqueous samples of each matrix. For field blanks de-ionized water will be poured directly into clean, laboratory-supplied containers and analyzed for the same parameters as the associated groundwater samples.

Trip blanks - Trip blanks will be included in each shipment of VOC samples. Trip blanks will originate in the laboratory and be prepared by filling two 40-milliliter VOC vials with laboratory de-ionized water and sealing the vials with septum-lined caps (allowing no head space). Trip blanks will accompany the sample bottles to the laboratory.

Method Blanks - Method blanks are generated within the laboratory and used to assess contamination resulting from laboratory procedures. A method blank will be run each day, or at frequencies specified by the laboratory.

Duplicate Samples - Duplicate samples are analyzed to check for sampling and analytical reproducibility. Duplicate samples will generally be collected at a frequency of one for every 10 or fewer investigative samples.

Matrix Spikes/Matrix Spike Duplicates - Matrix spikes and matrix spike duplicates (MS/MSD) provide information about the effect of the sample matrix on the digestion and measurement methodology. Matrix spikes are performed in duplicate and are hereinafter referred to as

MS/MSD samples. MS/MSD analysis will be conducted at a rate of one MS/MSD per 20 analytical samples or less in the laboratory batch or per sampling event. Sufficient volume for analysis of MS/MSD samples will be collected and provided to the laboratory at a rate of at least one per 20 samples. MS/MSD analysis requires triple the volume for VOCs and double the volume for extractable organics.

#### **6.6 Decontamination Procedures**

Field analytical equipment which may come in direct contact with the sample or sample media, including, but not limited to water level meters, water/product level meters, pH or specific ion probes, specific conductivity probes, thermometers, and/or borehole geophysical probes must be decontaminated before and after use, according to the procedures outlined below, unless manufacturers instructions indicate otherwise.

1. Cleaned with tap water and laboratory detergent using a brush if necessary to remove particular matter and surface films.
2. Rinsed thoroughly with tap water.
3. Rinsed thoroughly with distilled-de-ionized water and allowed to air dry.

#### **6.7 Calibration and Maintenance Procedures**

PID meters will be calibrated and maintained in general conformance with the manufacturer's recommendations twice daily.

Water level meters will be calibrated and maintained in general conformance with the manufacturer's recommendations. Once per sampling event, the known depth to water should be checked in the field office to verify that the water level meter is operating properly.

#### **6.8 Data Validation**

The purpose of the validation is to evaluate the analytical data in terms of certain prescribed criteria in order to assess the quality and usability of the data. During the validation process, each analytical result is flagged by a letter qualifier or combination of qualifiers that will indicate the usability of the result. For example, a "J" qualifier indicates that a result is usable, but represents an estimated value for the reason(s) given in the validation narrative. An "R" qualifier indicates that the result is rejected for the reason(s) stated in the narrative, and is therefore not a

usable data point for the purposes of site characterization or a risk assessment. The following are typical data qualifiers used during data validation and the corresponding definitions:

U	Not detected
J	Estimated value
UJ	Reported quantitation limit is qualified as estimated
R	Result is rejected and unusable

In addition to determining data quality and usability, the information derived from the data validation process will also aid in assessing the percent completeness of the data set. Laboratory completeness is defined in Section 3.3 of the QAPP as a measure of the amount of valid measurements obtained from all the measurements taken in the project.

The validation of analytical data will be performed by STS. Validation will consist of an evaluation of the following criteria:

- Sample/extract holding times
- Initial and continuing calibrations
- Blanks
- Surrogate spike recoveries
- MS/MSDs recoveries and %RPDs (for the MSDs)
- MS recoveries and duplicate %RPDs for inorganics
- LCS recoveries and %RPDs
- %RPDs for field duplicates
- Internal standards performance
- Organic compound identification and quantitation
- Reported detection limits
- System performance

The validation discussion in reports presenting the data will include of the following:

- Summary of samples and fractions reviewed
- Data assessment and narrative

- Data summary tables showing validation-qualified data
- Glossary of data qualifiers

All laboratory analytical data (100%) will be validated. If the initial rounds of data validation demonstrate that the laboratory reliably produces data of high quality and usability such that completeness objectives are met or exceeded, then the level of data quality reporting can be reduced from Level IV to Level II.

#### **6.9 Internal Quality Control Checks, Audits, and QC Corrective Measures**

Internal quality control checks, audits and QC corrective measures will be conducted as described in Sections 10, 11 and 13 of the QAPP.

#### **6.10 Calculation of Data Statistics**

Once the laboratory analytical data have been validated, the data will be statistically analyzed (if a sufficient number of samples are present) using the procedures described below and detailed in Volume 5, Section 9.3 of the Quality Assurance Project Plan.

Basic statistical calculations will be conducted on the concentrations of the analytes detected in the soil/slag-fill samples (if collected) and groundwater samples. The data will be tabulated for statistical analysis. Summary statistics will be presented for each of the datasets (soil and groundwater). These summary tables will include for each analyte:

- a. the frequency of detection
- b. the range of detected concentrations
- c. the range of reported detection limits
- d. the mean concentration (arithmetic or geometric)
- e. the standard deviation (arithmetic or geometric)
- f. data distribution

The most common method for using data for chemicals detected at least once but not in all samples in a specific dataset is to assign a value of one-half the sample quantitation limit in calculating summary statistics (USEPA, 1989a). This procedure may be followed (as appropriate) for this analysis. If a different value is used, the rationale for an alternative value will be provided in the final report.

## **7.0 REPORTS**

The data collected for the supplemental site investigation will be compiled into a report after the data has been verified and validated as described in Section 6.8. The report will include an overview of the sample collection procedures used, noting any deviations from the work plan and QAPP and a tabulated summary of the results. The data results tables will include the DQOs provided on Table 4-1 and a data quality assessment will be performed. The data quality assessment will include the following steps:

- A review of the DQOs and sample design;
- Conduct a preliminary data review;
- Select statistical method;
- Verify the assumptions of the method; and
- Draw conclusions from the data.

The results of the data quality assessment will be compared to Indiana standards and the magnitude and extent of impact identified. Results, conclusions and recommendations (as appropriate) will be provided.

The report will be supplemented with drawings, cross sections and graphs appropriate for display of the results. Boring logs, well construction reports, and laboratory data reports will be provided as appendices.



## **8.0 SCHEDULE FOR IMPLEMENTATION**

This work plan will be implemented according to the schedule provided in Table 8-1. The Coke Plant is subject to an economic redevelopment plan as the property appears to be a key component in a very significant facility expansion project being planned in the East Chicago vicinity. Thus, this work is being expedited to support the redevelopment.

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Tables



## **TABLES**

Table 4-1A – Analyte List for Slag-Fill/Soil

Table 4-1B – Analyte List for Groundwater

Table 5-1 – Monitoring Well and Piezometer Information Summary

Table 5-2 – Planned Groundwater Sample Summary

Table 5-3 – Planned Slag-fill/Soil Sample Summary

Table 8-1 – Project Schedule

Table 4-1A  
Analyte List for Slag-Fill/Soil (Includes DQOs, MDLs, PQLs and Acceptance Criteria)

Parameters	CAS #	Other Screening Criteria		Data Quality Objectives			Laboratory Objectives					
		IDEM <sup>1</sup> Construction Worker (mg/kg)	IDEM <sup>1</sup> Direct Contact (mg/kg)	IDEM <sup>A</sup> Migration to GW (mg/kg)	IDEM <sup>A</sup> Default Closure Level (mg/kg)	EPA <sup>B</sup> ESLs - Soil (mg/Kg)	Analytical			Acceptance Criteria		
							Prep/Method	MDL (mg/Kg)	PQL (mg/Kg)	LCS	MS/MSD	DUP
Metals												
Antimony <sup>C</sup>	7440-36-0	460*	620*	37	37	78 <sup>81</sup> /0.29 <sup>M</sup>	SW3050/SW6020A	0.00055	1	0-211	70-130	20
Arsenic	7440-38-2	320*	20*	5.8	5.8	5.7	SW3050/SW6020A	0.011	0.5	80.3-119	70-130	20
Beryllium <sup>C</sup>	7440-41-7	2,300	2,900	3,200	2,300	40 <sup>81</sup> /36 <sup>M</sup>	SW3050/SW6020A	0.0004	0.05	83.1-117	70-130	20
Cadmium <sup>C</sup>	7440-43-9	590*	990*	77	77	32 <sup>81</sup> /140 <sup>81</sup> /1.0 <sup>AV</sup> /0.38 <sup>M</sup>	SW3050/SW6020A	0.00011	0.1	82.1-118	70-130	20
Chromium	7440-47-3	1,000,000*	1,000,000*	1,000,000	10,000	0.4	SW3050/SW6020A	0.038	0.15	79.3-121	70-130	20
Chromium, hexavalent	18540-29-9	3400*	650*	120	120	NE	SW3050/SW6020A	0.0009	0.01	80-120	75-125	20
Copper	7440-50-8	46000*	62000*	2,900	2,900	5.4	SW3050/SW6020A	0.00078	0.5	83.2-117	70-130	20
Iron <sup>C</sup>	7439-89-6	NE	NE	NE	NE	*	SW3050/SW6020A	0.251	2.5	50.1-149	70-130	20
Lead <sup>C</sup>	7439-92-1	970	1,300	230	230	110 <sup>81</sup> /1,700 <sup>81</sup> /16 <sup>AV</sup> /59 <sup>M</sup>	SW3050/SW6020A	0.000434	0.375	81.5-118	70-130	20
Manganese	7439-96-5	NE	NE	NE	NE	NE	SW3050/SW6020A	0.0053	0.1	81.7-118	70-130	20
Mercury	7439-97-6	340	470	32	32	0.1	SW3050/SW6020A	0.00059	0.01	66.1-133	70-130	20
Molybdenum	7439-98-7	NE	NE	NE	NE	NE	SW3050/SW6020A	0.008	1	79.9-120	70-130	20
Nickel	7440-2-0	23,000	31,000	2,700	2,700	13.6	SW3050/SW6020A	0.00055	0.5	82-118	70-130	20
Selenium	7782-49-2	5,700*	7,800*	53	53	0.0276	SW3050/SW6020A	0.0028	0.25	77.6-122	70-130	20
Silver	7440-22-4	5,700*	7,800*	87	87	4.04	SW3050/SW6020A	0.0013	0.5	66.2-134	70-130	20
Thallium	7440-28-0	80*	110*	10	10	0.0569	SW3050/SW6020A	0.00028	0.25	77.4-123	70-130	20
Tin	7440-31-5	NE	NE	NE	NE	7.62	SW3050/SW6020A	0	1	69.9-130	70-130	20
Vanadium	7440-62-2	NE	NE	NE	NE	1.59	SW3050/SW6020A	0.059	0.4	77.1-123	70-130	20
Zinc	7440-66-6	340,000	470,000	38,000	10,000	6.62	SW3050/SW6020A	0.149	1	79.1-121	70-130	20
Potassium							SW3050/SW6020A	0.216	25	73.1-127	70-130	20
Other												
Total Organic Carbon (TOC)	None	NE	NE	NE	NE	NE	ASTM D2974	1	1	**	**	**
Sulfide	18496-25-8	NE	NE	NE	NE	0.00358	SW9030	0.009	0.1	10-175	10-149	20
Total Cyanides	57-12-5	23,000	31,000	9.6	9.6	1.33	9012A	0.002	0.005	90-110	40-155	20
Total Phenolics	None	NE	NE	NE	NE	NE	SW9066	0.003	0.01	78.3-121	53.9-123	22.5
Ammonia	None	NE	NE	NE	NE	NE	E350.2 r3 83	0.02	0.05	90-110	76.5-112	15
Chloride	None	NE	NE	NE	NE	NE	SW-9253	1	1	80-120	80-120	20
Sulfate	None	NE	NE	NE	NE	NE	E375.4 r3 83	2.6	10	85.9-112	72-107	10.1
pH	None						SW9045C	NA	0.01	99.71-100.29	NA	20
VOCs (8260+ S)												
1,1,1-Trichloroethane	74-55-6	34,000	6,700	280	280	29.8	Indiana 5035/SW8260B	1	5	66.4-137	51.5-149	24.4
1,1,2,2-Tetrachloroethane	79-34-5	960	8.7	0.11	0.11	0.127	Indiana 5035/SW8260B	1.4	5	55.6-125	24.9-201	85.2
1,1-Dichloroethane	75-34-3	8,600	1,700	58	58	20.1	Indiana 5035/SW8260B	0.7	5	68.9-126	60.5-134	24.1
1,1-Dichloroethylene	75-35-4	2,200	410	42	42	8.28	Indiana 5035/SW8260B	1.2	5	69.8-126	40.5-140	36.4
1,2-Dichloroethane	107-6-2	150	5.8	0.15	0.15	21.2	Indiana 5035/SW8260B	1.2	5	58.8-139	55.9-149	41.2
1,2-Dichloropropane	75-87-5	99	7.2	0.25	0.25	32.7	Indiana 5035/SW8260B	1	5	65.7-126	61.2-132	22.1
1,3-Dichloropropane	142-28-9	NE	NE	NE	NE	NE	Indiana 5035/SW8260B	0.7	5	0-0	0-0	0
2-Chloroethyl vinyl ether	110-75-8	NE	NE	NE	NE	NE	Indiana 5035/SW8260B	2.3	10	0-0	0-0	0
Acrolein	107-02-8	3.5	0.64	0.25	0.25	5.27	Indiana 5035/SW8260B	15.8	100	0-0	0-0	0
Acrylonitrile	107-13-1	NE	NE	NE	NE	0.0239	Indiana 5035/SW8260B	13	100	10-178	0-0	0
Benzene	71-43-2	560	14	0.35	0.35	0.255	Indiana 5035/SW8260B	1.2	5	68.1-124	54.3-134	32
bis (Chloromethyl) ether	542-88-1	NE	NE	NE	NE	NE	Indiana 5035/SW8260B	2.5	5	0-0	0-0	0
Bromoform	75-25-2	7,700	580	2.7	2.7	15.9	Indiana 5035/SW8260B	0.7	5	61.1-120	33-131	41.3
Bromomethane (Methyl Bromide)	74-83-9	69	13	0.7	0.7	0.235	Indiana 5035/SW8260B	3.6	10	31.8-135	0-277	112
Carbon tetrachloride	56-23-5	38	5.2	0.29	0.29	2.98	Indiana 5035/SW8260B	1.2	5	66.4-140	38.2-149	38.2
Chlorobenzene	108-90-7	2,600	510	27	27	13.1	Indiana 5035/SW8260B	0.6	5	75.3-120	63.4-130	19
Chlorodibromomethane	124-48-1			NE	NE	2.05	Indiana 5035/SW8260B	0.8	5	0-0	0-0	0
Chloroethane	75-0-3	16,000	120	10	10	NE	Indiana 5035/SW8260B	2.4	10	43.4-154	0-439	45
Chloroform	67-66-3	650	4.7	6	4.7	1.19	Indiana 5035/SW8260B	0.6	5	66.4-134	59.8-126	22.1
Chloromethane (Methyl Chloride)	74-87-3	NE	NE	NE	NE	10.4	Indiana 5035/SW8260B	1.5	10	31.7-107	22.5-155	73
Dichlorobromomethane <sup>U</sup>	75-27-4	2,100	17	0.51	0.51	0.54	Indiana 5035/SW8260B	0.5	5	0-0	0-0	0

Table 4-1A  
Analyte List for Slag-Fill/Soil (Includes DQOs, MDLs, PQLs and Acceptance Criteria)

	CAS #	Other Screening Criteria		Data Quality Objectives			Laboratory Objectives					
		IDEM <sup>1</sup>	IDEM <sup>1</sup>	IDEM <sup>A</sup>	IDEM <sup>A</sup>	EPA <sup>B</sup>	Analytical			Acceptance Criteria		
		Construction Worker	Direct Contact	Migration to GW	Default Closure Level	ESLs - Soil	Prep/Method	MDL	PQL	LCS	MS/MSD	DUP
Dichlorodifluoromethane	75-71-8	NE	NE	NE	NE	39.5	Indiana 5035/SW8260B	4.6	5	0-0	0-0	0
Ethylbenzene	100-41-4	29,000	6,800	200	160	5.16	Indiana 5035/SW8260B	0.7	5	65.6-127	33-161	70.9
Methylene chloride	75-9-2	22,000	200	1.8	1.8	4.05	Indiana 5035/SW8260B	8.7	20	43-147	29.8-177	38.8
Tetrachloroethylene	127-18-4	660	16	0.64	0.64	9.92	Indiana 5035/SW8260B	1.6	5	69.6-132	51.8-139	29.1
Toluene	108-88-3	49,000	16,000	96	96	5.45	Indiana 5035/SW8260B	0.7	5	67.2-125	45.3-147	44.7
trans-1,2-Dichloroethylene	156-60-5	1,200	230	14	14	0.784	Indiana 5035/SW8260B	1	5	68.4-131	48.7-145	36.5
Trichlorofluoromethane	75-69-4	NE	NE	NE	NE	NE	Indiana 5035/SW8260B	3.4	5	56.5-144	52.6-145	119
Vinyl chloride	75-1-4	250	6.4	0.027	0.027	0.646	Indiana 5035/SW8260B	1.7	10	34.3-133	21.5-174	49.3
<b>PAHs</b>												
Acenaphthene	83-32-9	50,000	24,000	1,200	1,200	682	SW3550/SW3550/SW8270C(SIM)	5.6	50	46.1-92.9	33.9-91.2	33.5
Acenaphthylene	208-96-8	5,900	2,800	180	180	682	SW3550/SW3550/SW8270C(SIM)	5.4	50	0	0	0
Anthracene	120-12-7	250,000	120,000	51	51	1,480	SW3550/SW3550/SW8270C(SIM)	7.8	50	0	0	0
Benzo(a)anthracene	56-55-3	790	15	62	15	5.21	SW3550/SW3550/SW8270C(SIM)	6.7	50	0	0	0
Benzo(a)pyrene	50-32-8	79	1.5	16	1.5	1.52	SW3550/SW3550/SW8270C(SIM)	7.1	50	0	0	0
Benzo(b)fluoranthene	205-99-2	790	15	74	15	59.8	SW3550/SW3550/SW8270C(SIM)	11	50	0	0	0
Benzo(g,h,i)perylene	191-24-2	NE	NE	NE	NE	119	SW3550/SW3550/SW8270C(SIM)	7.1	50	0	0	0
Benzo(k)fluoranthene	207-8-9	7,900	150	39	39	148	SW3550/SW3550/SW8270C(SIM)	9.3	50	0	0	0
Chrysene	218-1-9	79,000	1,500	25	25	4.75	SW3550/SW3550/SW8270C(SIM)	6.2	50	0	0	0
Dibenzo(a,h)anthracene	53-70-3	79	1.5	60	1.5	18.4	SW3550/SW3550/SW8270C(SIM)	7.4	50	0	0	0
Fluoranthene	206-44-0	33,000	16,000	880	880	122	SW3550/SW3550/SW8270C(SIM)	9.5	50	0	0	0
Fluorene	86-73-7	33,000	16,000	1,100	1,100	122	SW3550/SW3550/SW8270C(SIM)	5.8	50	0	0	0
Indeno (1,2,3-c,d) pyrene	193-39-5	790	15	3.1	3.1	109	SW3550/SW3550/SW8270C(SIM)	6.8	50	0	0	0
Naphthalene	91-20-3	17,000	8,000	170	170	0.0994	SW3550/SW3550/SW8270C(SIM)	5.3	50	0	0	0
Phenanthrene	85-1-8	2,500	1,200	170	170	45.7	SW3550/SW3550/SW8270C(SIM)	8.3	50	0	0	0
Pyrene	129-0-0	25,000	12,000	570	570	78.5	SW3550/SW3550/SW8270C(SIM)	6.1	50	31-133	22.3-117	47
<b>SVOCs</b>												
1,2,4-Trichlorobenzene	120-82-1	8,900	4,900	77	77	11.1	SW3550/SW8270C	23	330	42.4-84.7	26.2-87.1	26.2
1,2-Dichlorobenzene	95-50-1	18,000	3,900	270	220	2.96	SW3550/SW8270C	19.4	330	0-0	0-0	0
1,2-Diphenylhydrazine	122-66-7	NE	NE	NE	NE	NE	SW3550/SW8270C	20.8	330	0-0	0-0	0
1,4-Dichlorobenzene	106-46-7	8,000	73	3.4	3.4	0.546	SW3550/SW8270C	20.7	330	38.4-80.8	28.7-76.2	27.1
2,4,6-Trichlorophenol	88-6-2	89*	49*	0.2	0.2	9.94	SW3550/SW8270C	36.6	330	0-0	0-0	0
2,4-Dichlorophenol	120-83-2	2700*	1500*	3	3	87.5	SW3550/SW8270C	29.1	330	0-0	0-0	0
2,4-Dimethylphenol	105-67-9	18,000*	9,800*	25	25	0.01	SW3550/SW8270C	29.8	330	0-0	0-0	0
2,4-Dinitrophenol	51-28-5	1,800	980	0.82	0.82	0.0609	SW3550/SW8270C	310	1600	0-0	0-0	0
2,4-Dinitrotoluene	121-14-2	890	20	NE	NE	1.28	SW3550/SW8270C	37.2	330	37.4-107	23.3-102	23.7
2,6-Dinitrotoluene	606-20-2	890	20	NE	NE	0.0328	SW3550/SW8270C	36.5	330	0-0	0-0	0
2-Chloronaphthalene	91-58-7	71,000	39,000	560	560	0.0122	SW3550/SW8270C	60.4	330	0-0	0-0	0
2-Chlorophenol	95-57-8	2200*	580*	10	10	0.243	SW3550/SW8270C	23.6	330	29.1-101	20.8-97.8	30.3
2-Nitrophenol	88-75-5	NE	NE	NE	NE	1.6	SW3550/SW8270C	31.5	330	0-0	0-0	0
3,3-Dichlorobenzidine	91-94-1	1,400	31	0.21	0.21	0.646	SW3550/SW8270C	43.4	1600	0-0	0-0	0
4,6-Dinitro-2-methylphenol	534-52-1	NE	NE	NE	NE	0.144	SW3550/SW8270C	43.1	1600	0-0	0-0	0
4-Bromophenyl phenyl ether	101-55-3	NE	NE	NE	NE	NE	SW3550/SW8270C	22.9	330	0-0	0-0	0
4-Chloro-3-methylphenol	59-50-7	NE	NE	NE	NE	NE	SW3550/SW8270C	49.2	660	38-118	18.6-118	28
4-Chlorophenyl phenyl ether	7005-72-3	NE	NE	NE	NE	NE	SW3550/SW8270C	21.4	330	0-0	0-0	0
4-Nitrophenol	100-02-7	NE	NE	NE	NE	5.12	SW3550/SW8270C	292	1600	36.3-135	5-141	23

Table 4-1A  
Analyte List for Slag-Fill/Soil (Includes DQOs, MDLs, PQLs and Acceptance Criteria)

	CAS #	Other Screening Criteria		Data Quality Objectives			Laboratory Objectives					
		IDEM <sup>1</sup> Construction Worker	IDEM <sup>1</sup> Direct Contact	IDEM <sup>A</sup> Migration to GW	IDEM <sup>A</sup> Default Closure Level	EPA <sup>B</sup> ESLs - Soil	Analytical			Acceptance Criteria		
							Prep/Method	MDL	PQL	LCS	MS/MSD	DUP
Benzidine	92-87-5	NE	NE	NE	NE	NE	SW3550/SW8270C	1421	1600	0-0	0-0	0
bis(2-Chloroethoxy)methane	111-91-1	NE	NE	NE	NE	0.302	SW3550/SW8270C	22	330	0-0	0-0	0
bis(2-Chloroethyl)ether	111-44-4	280	3	0.012	0.012	23.7	SW3550/SW8270C	20.9	330	0-0	0-0	0
bis(2-Chloroisopropyl)ether	108-60-1	5,200	61	0.26	0.26	19.9	SW3550/SW8270C	16.6	330	0-0	0-0	0
bis(2-Ethylhexyl)phthalate	117-81-7	18,000	980	120,000	980	0.925	SW3550/SW8270C	47.3	330	0-0	0-0	0
Butylbenzylphthalate	85-68-7	180,000	98,000	6,200	310	0.239	SW3550/SW8270C	39.8	330	0-0	0-0	0
Diethylphthalate	84-66-2	710,000	390,000	1,300	840	24.8	SW3550/SW8270C	34	330	0-0	0-0	0
Dimethylphthalate	131-11-3	1,000,000	1,000,000	5,600	1,100	734	SW3550/SW8270C	24.6	330	0-0	0-0	0
Di-n-butylphthalate	84-74-2	89,000	49,000	NE	NE	0.150	SW3550/SW8270C	35.7	330	0-0	0-0	0
Di-n-octylphthalate	117-84-0	36,000	20,000	67,000	2,000	709	SW3550/SW8270C	56.8	330	0-0	0-0	0
Hexachlorobenzene	118-74-1	390	8.6	3.9	3.9	0.199	SW3550/SW8270C	31.5	330	0-0	0-0	0
Hexachlorobutadiene	87-68-3	NE	NE	NE	NE	0.0398	SW3550/SW8270C	20.2	330	0-0	0-0	0
Hexachlorocyclopentadiene	77-47-4	5,300	2,900	4,900	720	0.755	SW3550/SW8270C	25.1	330	0-0	0-0	0
Hexachloroethane	67-72-1	660	240	7.7	7.7	0.596	SW3550/SW8270C	23.6	330	0-0	0-0	0
Isophorone	78-59-1	180,000	14,000	18	18	139	SW3550/SW8270C	19.3	330	0-0	0-0	0
Nitrobenzene	98-95-3	440	250	0.34	0.34	1.31	SW3550/SW8270C	19.3	330	0-0	0-0	0
N-Nitrosodimethylamine	62-75-9	NE	NE	NE	NE	0.0000321	SW3550/SW8270C	74.4	330	0-0	0-0	0
N-Nitroso-di-n-propylamine	621-64-7	89	2	0.002	0.002	0.544	SW3550/SW8270C	23.6	330	36.9-105	30.3-97.7	27
N-Nitrosodiphenylamine	86-30-6	180,000*	2,800*	32	32	0.545	SW3550/SW8270C	22	330	0-0	0-0	0
Pentachlorophenol	87-86-5	3,800	54	0.66	0.66	0.119	SW3550/SW8270C	44	1600	14.6-107	5-102	16
Phenol	108-95-2	230,000*	96,000*	160	160	120	SW3550/SW8270C	23.1	330	26.4-110	9.09-110	30.5

<sup>A</sup>IDEM - Indiana Department of Environmental Management, 2001, Risk Integrated System of Closure, Appendix 1 Table A - Default Closure Table - Industrial with 2006 Table A update

<sup>B</sup>EPA - US EPA Region V Ecological Screening Levels (August, 2003)

<sup>C</sup>US EPA National Ecological Soil Screening Levels (November, 2003)

<sup>D</sup>-Plants/<sup>PL</sup>=Soil Invertebrates/<sup>IV</sup>=Avian/<sup>M</sup>=Mammalian wildlife

\* Site specific value to be determined of pH if soils is <5 or >8.

\*\* These compounds are not spiked

-The PAH compounds for soil and sediment samples will be analyzed by method 8270C - SIM to achieve lower PQLs.

-Several of the acceptance limits for LCS, MS/MSDs, are based on statistical studies; these limits are subject to change.

-Microbac Laboratory Inc. MDLS are updated on an annual basis. Based on these annual MDL studies, MDL and PQLs are subject to change.



Table 4-1B  
Analyte List for Groundwater (Includes DQOs, MDLs, PQLs, and Acceptance Criteria)

CAS #		IDEM <sup>A</sup>	IDEM <sup>A</sup>	IDEM <sup>A</sup>	IDEM <sup>A</sup> Closure Level (mg/L)	EPA <sup>B</sup>	Analytical			Acceptance Criteria				
							GW Solubility (mg/L)	MCL (mg/L)	Industrial (mg/L)	ESLs - water (mg/L)	Prep/Method	MDL	PQL	LCS
Parameters														
Metals (mg/L)														
Antimony	7440-36-0	NE	0.006	0.041	0.041	0.08	SW3010A/SW6020A	0.000038	0.006	85-115	70-130	20		
Arsenic	7440-38-2	NE	0.01	0.0019	0.01	0.148	SW3010A/SW6020A	0.000031	0.01	85-115	70-130	20		
Beryllium	7440-41-7	NE	0.004	0.2	0.2	0.0036	SW3010A/SW6020A	0.0000078	0.001	85-115	70-130	20		
Cadmium	7440-43-9	NE	0.005	0.051	0.051	0.00015	SW3010A/SW6020A	0.0000044	0.002	85-115	70-130	20		
Chromium	7440-47-3	NE	0.1	150	150	0.042	SW3010A/SW6020A	0.00083	0.003	85-115	70-130	20		
Chromium, hexavalent	18540-29-9	NE	0.1	0.31	0.31	NE	SW7196A	0.004	0.01	90-110	85-115	20		
Copper	7440-50-8	NE	1.3	4.1	4.1	0.00158	SW3010A/SW6020A	0.000088	0.01	85-115	70-130	20		
Iron	7439-89-6	NE	NE	NE	NE	NE	SW3010A/SW6020A	0.011	0.05	85-115	70-130	20		
Lead	7439-92-1	NE	0.015	0.042	0.042	0.00117	SW3010A/SW6020A	0.00012	0.0075	85-115	70-130	20		
Manganese	7439-96-5	NE	NE	NE	NE	NE	SW3010A/SW6020A	0.000074	0.002	85-115	70-130	20		
Mercury	7439-97-6	69,000	0.002	0.031	0.031	1.3X10 <sup>-6</sup>	SW3010A/SW6020A	0.000026	0.0002	85-115	70-130	20		
Molybdenum	7439-98-7	NE	NE	NE	NE	NE	SW3010A/SW6020A	0.00064	0.02	85-115	70-130	20		
Nickel	7440-2-0	NE	NE	2	2	0.0289	SW3010A/SW6020A	0.000031	0.01	85-115	70-130	20		
Selenium	7782-49-2	NE	0.05	0.51	0.51	0.005	SW3010A/SW6020A	0.000043	0.005	85-115	70-130	20		
Silver	7440-22-4	NE	NE	0.51	0.51	0.00012	SW3010A/SW6020A	0.0000025	0.01	85-115	70-130	20		
Thallium	7440-28-0	NE	0.002	0.0072	0.0072	0.01	SW3010A/SW6020A	0.0000065	0.002	85-115	70-130	20		
Tin	7440-31-5	NE	NE	NE	NE	0.18	SW3010A/SW6020A	0	0.02	85-115	70-130	20		
Vanadium	7440-62-2	NE	NE	NE	NE	0.012	SW3010A/SW6020A	0.0011	0.008	85-115	70-130	20		
Zinc	7440-66-6	NE	NE	31	31	0.0657	SW3010A/SW6020A	0.0038	0.02	85-115	70-130	20		
Boron	7440-42-8	NE	NE	NE	NE	NE	SW3010A/SW6020A	0.00068	0.02	85-115	70-130	20		
Sodium	7440-23-5	NE	NE	NE	NE	NE	SW3010A/SW6020A	0.0045	0.5	85-115	70-130	20		
Potassium							SW3010A/SW6020A	0.004	0.5	85-115	70-130	20		
Other														
Alkalinity	None	NE	NE	NE	NE	NE	M2320B 19Ed	2	10	95.9-107	N/A	6.3		
Ammonia	7664-41-7	NE	NE	NE	NE	NE	E350.1	0.1	0.042	85-122	72-129	20		
Hardness	None	NE	NE	NE	NE	NE	M2340B 19Ed	0.31	3.3	NA	NA	NA		
Sulfide	18496-25-8	NE	NE	NE	NE	NE	E376.2 r3 83	0.02	0.05	10-175	61.1-149	10		
Total Cyanides	57-12-5	NE	NE	NE	NE	0.0052	SW-9012A	0.002	0.005	90-110	64.9-138	20		
Total Phenolics	None	NE	NE	NE	NE	0.18	SW9066	0.003	0.01	78.3-121	80.2-119	17.4		
Total Organic Carbon	None	NE	NE	NE	NE	NE	EPA 415.2	1	1	NA	NA	NA		
Chloride	16887-00-6	NE	NE	NE	NE	NE	E415.1	0.5	0.5	90-110	90-110	20		
Chemical Oxygen Demand	None	NE	NE	NE	NE	NE	M4500-CI	1	1	80-120	80-120	20		
Sulfate							E375.4 r3 83	2.6	10	85.9-112	72-107	10.1		
VOCs														
Acrolein	107-02-8	210,000	NE	0.051	0.051	0.00019	SW8260B	3.8	10	NA	NA	0		
Acrylonitrile	107-13-1	NE	NE	NE	NE	0.066	SW8260B	4.5	10	NA	NA	0		
Benzene	71-43-2	1,800	0.005	0.052	0.052	0.114	SW8260B	0.3	1	75.4-121	60.6-130	23.7		
bis (Chloromethyl) ether	542-88-1	NE	NE	NE	NE	NE	SW8260B	0.5	1	NA	NA	0		
Bromoform	75-25-2	3,100	0.08	0.36	0.36	0.23	SW8260B	0.4	1	60-131	40.5-146	28.8		
Carbon tetrachloride	56-23-5	790	0.005	0.022	0.022	0.24	SW8260B	0.3	1	65.5-134	47.2-149	31.1		
Chlorobenzene	108-90-7	470	0.1	2	2	0.047	SW8260B	0.2	1	81.1-120	75.6-127	23		
Chlorodibromomethane	124-48-1	NE	NE	NE	NE	NE	SW8260B	0.6	1	NA	NA	0		
Chloroethane	75-0-3	5,700	NE	0.99	0.99	NE	SW8260B	0.8	2	NA	0-357	29.3		

Table 4-1B  
Analyte List for Groundwater (Includes DQOs, MDLs, PQLs, and Acceptance Criteria)

Parameters	CAS #	IDEM <sup>A</sup> GW Solubility (mg/L)	IDEM <sup>A</sup> MCL (mg/L)	IDEM <sup>A</sup> Industrial (mg/L)	IDEM <sup>A</sup> Closure Level (mg/L)	EPA <sup>B</sup> ESLs - water (mg/L)	Analytical			Acceptance Criteria		
							Prep/Method	MDL	PQL	LCS	MS/MSD	DUP
2-Chloroethyl vinyl ether	110-75-8	NE	NE	NE	NE	NE	SW8260B	0.4	2	10-205	NA	0
Chloroform	67-66-3	7,900	0.08	1	1	0.14	SW8260B	0.7	1	74.1-123	71.2-120	25
Dichlorobromomethane <sup>C</sup>	75-27-4	6,700	0.08	0.046	0.08	NE	SW8260B	0.5	1	NA	NA	0
Dichlorodifluoromethane	75-71-8	NE	NE	NE	NE	NE	SW8260B	0.9	2	NA	NA	0
1,1-Dichloroethane	75-34-3	5,100	NE	10	10	0.047	SW8260B	0.3	1	77-132	68-119	14.2
1,2-Dichloroethane	107-6-2	8,500	0.005	0.031	0.031	0.91	SW8260B	0.4	1	68-127	67.7-133	23.3
1,1-Dichloroethylene	75-35-4	2,300	0.007	5.1	5.1	0.065	SW8260B	0.4	1	47.5-153	50.1-125	31
1,2-Dichloropropane	75-87-5	2,800	0.005	0.042	0.042	0.36	SW8260B	0.3	1	74.4-126	71.4-125	26
1,3-Dichloropropane	142-28-9	NE	NE	NE	NE	NE	SW8260B	0.6	1	NA	69.3-116	18.2
Ethylbenzene	100-41-4	170	0.7	10	10	0.014	SW8260B	0.2	1	73.6-125	60.6-144	25.2
Methyl Bromide (Bromomethane)	74-83-9	15,000	NE	0.14	0.14	0.016	SW8260B	0.6	2	NA	0-243	52.8
Methyl Chloride (Chloromethane)	74-87-3	NE	NE	NE	NE	NE	SW8260B	0.3	2	22.5-147	10.8-155	90.9
Methylene chloride	75-9-2	13,000	0.005	0.38	0.38	0.94	SW8260B	0.7	2	37.6-136	55.4-130	28.7
1,1,2,2-Tetrachloroethane	79-34-5	3,000	NE	0.014	0.014	0.38	SW8260B	0.7	1	69.8-123	46.8-168	22.3
Tetrachloroethylene	127-18-4	200	0.005	0.055	0.055	0.045	SW8260B	0.4	1	70.1-134	60.1-144	29.7
Toluene	108-88-3	530	1	8.2	8.2	0.253	SW8260B	0.3	1	76.4-123	69.7-130	25.4
trans-1,2-Dichloroethylene	156-60-5	6,300	0.1	2	2	0.97	SW8260B	0.4	1	64.5-143	56.9-130	66.1
1,1,1-Trichloroethane	74-55-6	1,300	0.2	29	29	0.076	SW8260B	0.3	1	70.8-131	63-136	29
Trichlorofluoromethane	75-69-4	NE	NE	NE	NE	NE	SW8260B	0.2	2	55.1-156	58.1-156	81.6
Vinyl chloride	75-1-4	2,800	0.002	0.004	0.004	0.93	SW8260B	0.4	2	37.1-149	33-151	31.2
PAHs												
Acenaphthene	83-32-9	4.2	NE	6.1	4.2	0.038	SW3510B/SW8310	0.256	5	22.5-95	10-126	32
Acenaphthylene	208-96-8	3.9	NE	0.73	0.73	4.84	SW3510B/SW8310	0.092	2.5	22.5-92.4	10-125	42
Anthracene	120-12-7	0.043	NE	31	0.043	0.000035	SW3510B/SW8310	0.029	0.1	30.4-107	18.6-132	37
Benzo(a)anthracene	56-55-3	0.0094	NE	0.0039	0.0039	0.000025	SW3510B/SW8310	0.022	0.1	29.8-116	10-153	30
Benzo(a)pyrene	50-32-8	0.0016	0.0002	0.00039	0.00039	0.000014	SW3510B/SW8310	0.024	0.2	29.7-120	13.6-136	38
Benzo(b)fluoranthene	205-99-2	0.0015	NE	0.0039	0.0015	0.00907	SW3510B/SW8310	0.017	0.1	31.6-113	10-144	31
Benzo(g,h,i)perylene	191-24-2	NE	NE	NE	NE	0.00764	SW3510B/SW8310	0.028	0.4	10-125	10-122	35
Benzo(k)fluoranthene	207-8-9	0.0008	NE	0.039	0.0008	NE	SW3510B/SW8310	0.028	0.1	13.4-137	10-161	39
Chrysene	218-1-9	0.0016	NE	0.39	0.0016	NE	SW3510B/SW8310	0.014	0.2	27.7-111	10-203	32
Dibenzo(a,h)anthracene	53-70-3	0.0025	NE	0.00039	0.00039	NE	SW3510B/SW8310	0.108	0.3	10-105	10-119	40
Fluoranthene	206-44-0	0.21	NE	4.1	0.21	0.0019	SW3510B/SW8310	0.029	0.25	30.6-116	10-152	34
Fluorene	86-73-7	2	NE	4.1	2	0.019	SW3510B/SW8310	0.137	0.5	24-101	10-127	35
Indeno (1,2,3-c,d) pyrene	193-39-5	0.000022	NE	0.0039	0.000022	0.00431	SW3510B/SW8310	0.02	0.25	25-129	10-149	42
Naphthalene	91-20-3	31	NE	2	2	0.013	SW3510B/SW8310	0.182	2.5	10-120	10-202	36
Phenanthrene	85-1-8	1.2	NE	0.31	0.31	0.0036	SW3510B/SW8310	0.044	0.2	27.5-112	10-149	32
Pyrene	129-0-0	0.14	NE	3.1	3.1	0.0003	SW3510B/SW8310	0.093	0.5	31-118	14.5-142	31
SVOCs												
1,2,4-Trichlorobenzene	120-82-1	300	0.07	1	1	0.030	SW3510B/SW8270C	0.9	10	19.7-80.9	6.56-93.1	44.8
1,2-Dichlorobenzene	95-50-1	160	0.6	9.2	9.2	0.014	SW3510B/SW8270C	0.7	10	NA	NA	0
1,2-Diphenylhydrazine	122-66-7	NE	NE	NE	NE	NE	SW3510B/SW8270C	1	10	NA	NA	0
1,4-Dichlorobenzene	106-46-7	74	0.075	0.12	0.12	0.0094	SW3510B/SW8270C	0.9	10	20.6-82	12.1-93.1	39.7
2,4,6-Trichlorophenol	88-6-2	800	NE	0.01	0.01	0.0049	SW3510B/SW8270C	0.9	10	NA	NA	0
2,4-Dichlorophenol	120-83-2	4,500	NE	0.31	0.31	0.011	SW3510B/SW8270C	0.7	10	NA	NA	0
2,4-Dimethylphenol	105-67-9	7,900	NE	2	2	0.1	SW3510B/SW8270C	0.8	10	NA	NA	0

Table 4-1B  
Analyte List for Groundwater (Includes DQOs, MDLs, PQLs, and Acceptance Criteria)

Parameters	CAS #	IDEM <sup>A</sup> GW Solubility (mg/L)	IDEM <sup>A</sup> MCL (mg/L)	IDEM <sup>A</sup> Industrial (mg/L)	IDEM <sup>A</sup> Closure Level (mg/L)	EPA <sup>B</sup> ESLs - water (mg/L)	Analytical			Acceptance Criteria		
							Prep/Method	MDL	PQL	LCS	MS/MSD	DUP
2,4-Dinitrophenol	51-28-5	2,800	NE	0.2	0.2	0.019	SW3510B/SW8270C	9.4	50	NA	NA	0
2,4-Dinitrotoluene	121-14-2	NE	NE	NE	NE	0.044	SW3510B/SW8270C	0.8	10	23.5-95.4	18.7-96.2	36.5
2,6-Dinitrotoluene	606-20-2	NE	NE	NE	NE	0.081	SW3510B/SW8270C	1.1	10	NA	NA	0
2-Chloronaphthalene	91-58-7	12	NE	8.2	8.2	0.000396	SW3510B/SW8270C	0.9	10	NA	NA	0
2-Chlorophenol	95-57-8	22,000	NE	0.51	0.51	0.024	SW3510B/SW8270C	0.7	10	31.3-81.3	5-106	44.3
2-Nitrophenol (o-Nitrophenol)	88-75-5	NE	NE	NE	NE	NE	SW3510B/SW8270C	1	10	NA	NA	0
3,3-Dichlorobenzidine	91-94-1	3.1	NE	0.0064	0.0064	0.0045	SW3510B/SW8270C	0.7	50	NA	NA	0
4,6-Dinitro-o-cresol	534-52-1	NE	NE	NE	NE	0.023	SW3510B/SW8270C	1.1	50	NA	NA	0
4-Bromophenyl phenyl ether	101-55-3	NE	NE	NE	NE	0.0015	SW3510B/SW8270C	0.9	10	NA	NA	0
4-Chlorophenyl phenyl ether	7005-72-3	NE	NE	NE	NE	NE	SW3510B/SW8270C	0.9	10	NA	NA	0
4-Nitrophenol (p-Nitrophenol)	100-02-7	NE	NE	NE	NE	0.06	SW3510B/SW8270C	1.7	50	NA	NA	0
Benzidine	92-87-5	NE	NE	NE	NE	NE	SW3510B/SW8270C	35.5	50	NA	NA	0
bis(2-Chloroethoxy)methane <sup>D</sup>	111-91-1	NE	NE	NE	NE	NE	SW3510B/SW8270C	1	10	NA	NA	0
bis(2-Chloroethyl)ether <sup>E</sup>	111-44-4	17,000	NE	0.0026	0.0026	19	SW3510B/SW8270C	0.9	10	NA	NA	0
bis(2-Chloroisopropyl)ether	108-60-1	1,700	NE	0.041	0.041	NE	SW3510B/SW8270C	0.9	10	NA	NA	0
bis(2-Ethylhexyl)phthalate	117-81-7	0.34	0.006	0.2	0.2	0.0003	SW3510B/SW8270C	1.1	10	NA	NA	0
Butylbenzylphthalate	85-68-7	2.7	NE	20	2.7	0.023	SW3510B/SW8270C	1	10	NA	NA	0
Diethylphthalate	84-66-2	1,100	NE	82	82	0.11	SW3510B/SW8270C	1.1	10	NA	NA	0
Dimethylphthalate	131-11-3	4,000	NE	1,000	1,000	NE	SW3510B/SW8270C	0.9	10	NA	NA	0
Di-n-butylphthalate	84-74-2	11	NE	10	10	0.0097	SW3510B/SW8270C	1.2	10	NA	NA	0
Di-n-octylphthalate	117-84-0	0.02	NE	4.1	0.02	0.030	SW3510B/SW8270C	1.1	10	NA	NA	0
Hexachlorobenzene	118-74-1	6.2	0.001	0.0018	0.0018	3X10 <sup>-7</sup>	SW3510B/SW8270C	0.9	10	NA	NA	0
Hexachlorobutadiene	87-68-3	3.2	NE	0.031	0.031	0.000053	SW3510B/SW8270C	0.9	10	NA	NA	0
Hexachlorocyclopentadiene	77-47-4	1.8	0.05	0.61	0.61	0.077	SW3510B/SW8270C	0.6	10	NA	NA	0
Hexachloroethane	67-72-1	50	NE	0.1	0.1	0.008	SW3510B/SW8270C	0.9	10	NA	NA	0
Isophorone	78-59-1	12,000	NE	3	3	0.92	SW3510B/SW8270C	1	10	NA	NA	0
Nitrobenzene	98-95-3	2,100	NE	0.051	0.051	NE	SW3510B/SW8270C	1	10	NA	NA	0
N-Nitrosodimethylamine	62-75-9	NE	NE	NE	NE	NE	SW3510B/SW8270C	0.7	10	NA	NA	0
N-Nitroso-di-n-propylamine	621-64-7	9,900	NE	0.00041	0.00041	NE	SW3510B/SW8270C	1	10	15.9-119	6.65-116	42.7
N-Nitrosodiphenylamine	86-30-6	35	NE	0.58	0.58	NE	SW3510B/SW8270C	0.7	10	NA	NA	0
p-Chloro-m-cresol	59-50-7	NE	NE	NE	NE	NE	SW3510B/SW8270C	1.2	20	27.2-97.7	9.03-111	43.6
Pentachlorophenol	87-86-5	2,000	0.001	0.024	0.024	0.004	SW3510B/SW8270C	1.3	50	5-114	5-135	29.2
Phenol	108-95-2	83,000	NE	31	31	0.180	SW3510B/SW8270C	0.4	10	5-46.7	5-70.4	55

<sup>A</sup>IDEM - Indiana Department of Environmental Management, 2001, Risk Integrated System of Closure, Appendix 1 Table A - Default Closure Table - Industrial with 2006 Table A update

<sup>B</sup>EPA - US EPA Region V Ecological Screening Levels August 2003

<sup>C</sup>IDEM = Bromodichloromethane

<sup>D</sup>EPA lists this as Methane [bis (2-chloroethoxy)]

<sup>E</sup>EPA lists this as Chloro-2-methylethyl ether [bis(2-)]

The VOC compound "bis(chloromethyl)ether" degrades in water - therefore cannot be calibrated - Microbac will perform a TIC search for this compound in the samples.

-The PAH compounds for the aqueous samples will be analyzed by SW8310 to achieve lower reporting limits.

-The VOC compounds for the aqueous samples will be analyzed using a 25mL Purge to achieve lower PQLs.

- Microbac Laboratory Inc. MDLs are updated on an annual basis. Based on these annual MDL studies, MDL and PQLs are subject to change.

**Table 5-1**  
**Former Coke Plant - Monitoring Well and Piezometer Information Summary**  
**Mittal Steel USA-Indiana Harbor West**

Well No.	Well Type	Ground Surface Elevation (feet msl)	Top of PVC Casing Elevation (feet)	Well Depth (Feet from TOC) <sup>A</sup>	Stick up Height (feet)	Screen Length (feet)	Top of Screen (feet msl)
MW-801D	D	589.7	592.48	42.32	2.80	3	553.16
MW-801S	WT	589.6	592.24	15.93	2.65	10	586.31
MW-802S	WT	590.1	592.66	16.50	2.58	10	586.16
MW-803D	D	590.9	593.26	43.16	2.40	3	553.10
MW-803S	WT	590.9	593.48	19.03	2.61	10	584.45
MW-804S	WT	590.2	592.70	16.50	2.51	10	586.20
MW-805D	D	590.4	593.28	42.65	2.88	3	553.63
MW-805S	WT	590.2	592.87	16.67	2.63	10	586.20
MW-806D	D	591.7	594.18	43.45	2.53	3	553.73
MW-806S	WT	591.6	594.27	18.71	2.72	10	585.56
MW-807D	D	590.8	593.29	41.35	2.54	3	554.94
MW-807S	WT	590.6	593.34	20.04	2.79	10	583.30
MW-808D	D	591.8	594.29	42.61	2.54	3	554.68
MW-808S	WT	592.1	594.69	18.41	2.64	10	586.28
MW-809D	D	TBD	TBD	estimated 40+	TBD	3	TBD
MW-809S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-810D	D	TBD	TBD	estimated 40+	TBD	3	TBD
MW-810S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-811S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-812S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-813S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-814S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-815D	D	TBD	TBD	estimated 40+	TBD	3	TBD
MW-815S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-816D	D	TBD	TBD	estimated 40+	TBD	3	TBD
MW-816S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-817D	D	TBD	TBD	estimated 40+	TBD	3	TBD
MW-817S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
MW-818S	WT	TBD	TBD	estimated 15-16	TBD	10	TBD
PZ-890	WT	TBD	TBD	estimated 13-14	TBD	10	TBD
PZ-891	WT	TBD	TBD	estimated 13-14	TBD	10	TBD

Notes: D = Deep

WT=Water Table

msl = mean sea level (National Geodetic Vertical Datum of 1929 (NGVD29))

TBD = to be determined

TOC = top of casing

<sup>A</sup> As measured inside of well casing

Table 5-2  
 Former Coke Plant - Planned Groundwater Sample Summary  
 ISG-Indiana Harbor/Tecumseh Redevelopment

Well No.	Screened Zone	Groundwater Sample Identification Number	Proposed Analytes						
			VOCs <sup>A</sup>	PAHs	Metals <sup>B</sup>	Phenol & 2,4-DMP	Ammonia	General Chemistry <sup>C</sup>	Full QAPP List <sup>D</sup>
MW-801D	D	MW-801D-GW-(mm/dd/yy)	x		x		x	x	
MW-801S	WT	MW-801S-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-802S	WT	MW-802S-GW-(mm/dd/yy)	x		x		x	x	
MW-803D	D	MW-803D-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-803S	WT	MW-803S-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-804S	WT	MW-804S-GW-(mm/dd/yy)	x		x		x	x	
MW-805D	D	MW-805D-GW-(mm/dd/yy)	x		x		x	x	
MW-805S	WT	MW-805S-GW-(mm/dd/yy)	x		x		x	x	
MW-806D	D	MW-806D-GW-(mm/dd/yy)	x		x		x	x	
MW-806S	WT	MW-806S-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-807D	D	MW-807D-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-807S	WT	MW-807S-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-808D	D	MW-808D-GW-(mm/dd/yy)	x	x	x	x	x	x	
MW-808S	WT	MW-808S-GW-(mm/dd/yy)	x		x		x	x	
MW-809D	D	MW-809D-GW-(mm/dd/yy)						x	x
MW-809S	WT	MW-809S-GW-(mm/dd/yy)						x	x
MW-810D	D	MW-810D-GW-(mm/dd/yy)						x	x
MW-810S	WT	MW-810S-GW-(mm/dd/yy)						x	x
MW-811S	WT	MW-811S-GW-(mm/dd/yy)						x	x
MW-812S	WT	MW-812S-GW-(mm/dd/yy)						x	x
MW-813S	WT	MW-813S-GW-(mm/dd/yy)						x	x
MW-814S	WT	MW-814S-GW-(mm/dd/yy)						x	x
MW-815D	D	MW-815D-GW-(mm/dd/yy)						x	x
MW-815S	WT	MW-815S-GW-(mm/dd/yy)						x	x
MW-816D	D	MW-816D-GW-(mm/dd/yy)						x	x
MW-816S	WT	MW-816S-GW-(mm/dd/yy)						x	x
MW-817D	D	MW-817D-GW-(mm/dd/yy)						x	x
MW-817S	WT	MW-817S-GW-(mm/dd/yy)						x	x
MW-818S	WT	MW-818S-GW-(mm/dd/yy)						x	x

Notes:

<sup>A</sup> Project Specific VOC list, see Table 4-1B

<sup>B</sup> Metals include: antimony, arsenic, calcium, iron, magnesium, manganese, potassium, sodium

<sup>C</sup> General Chemistry parameters include bicarbonate alkalinity, chloride, sulfate

<sup>D</sup> List of analytes is shown on Table 4-1B

(mm/dd/yy) = code for month, day and year on which the sample was collected

2,4-DMP = 2,4-dimethylphenol

**Table 5-3**  
**Former Coke Plant - Planned Slag-Fill/Soil Sample Summary**  
**ISG-Indiana Harbor/Tecumseh Redevelopment**

Well No.	Planned Slag-fill/Soil Sample Identification Number <sup>1</sup>	Proposed Analytes <sup>2</sup>			
		VOCs	SVOCs (incl. PAHs)	Metals	General Chemistry
MW-809S	MW-809S-S-(depth)	x	x	x	x
MW-809D	MW-809D-S-(depth)	x	x	x	x
MW-810D	MW-810D-S-(depth)	x	x	x	x
MW-811S	MW-811S-S-(depth)	x	x	x	x
MW-812S	MW-812S-S-(depth)	x	x	x	x
MW-813S	MW-813S-S-(depth)	x	x	x	x
MW-814S	MW-814S-S-(depth)	x	x	x	x
MW-815S	MW-815S-S-(depth)	x	x	x	x
MW-815D	MW-815D-S-(depth)	x	x	x	x
MW-816S	MW-816S-S-(depth)	x	x	x	x
MW-816D	MW-816D-S-(depth)	x	x	x	x
MW-817S	MW-817S-S-(depth)	x	x	x	x
MW-818S	MW-818S-S-(depth)	x	x	x	x

**Notes:**

<sup>1</sup> No soil samples are planned for collection at the former coke plant. However, if field indications are present, then one or more samples, from the interval above the water table, will be collected.

<sup>2</sup> Specific analytes included in groups are on Table 4-1A

(Depth) Interval in feet below ground surface, from which the sample was obtained.

Table 8-1  
Project Schedule  
Tecumseh, Former Coke Plant Supplemental Site Investigation

ID	Task Name	Duration	Start	Finish	June	July	August	September	October	November	December	January
1	Clear Utilities, geophysical survey of well area	2 days	Wed 6/6/07	Thu 6/7/07								
2	Commence well installation/soil sampling	14 days	Mon 6/11/07	Thu 6/28/07								
3	Develop wells	10 days	Mon 6/18/07	Fri 6/29/07								
4	Sample groundwater, survey new wells, slug test wells	10 days	Mon 7/16/07	Fri 7/27/07								
5	Perform Soil Data Validation	5 days	Mon 8/13/07	Fri 8/17/07								
6	Perform Groundwater Data Validation	10 days	Mon 9/10/07	Fri 9/21/07								
7	Prepare Coke Plant Supplemental Site Investigation Report	60 days	Mon 9/24/07	Fri 12/14/07								
8	Submit Draft Report to Tecumseh	0 days	Mon 12/17/07	Mon 12/17/07								
9	Submit Final Report	0 days	Fri 12/21/07	Fri 12/21/07								

Project: T108741FF-Table\_8-1\_projec  
Date: Thu 6/7/07

Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Milestone

Rolled Up Progress

Split

External Tasks

Project Summary

Group By Summary





THE  
INFRASTRUCTURE  
IMPERATIVE

Figures

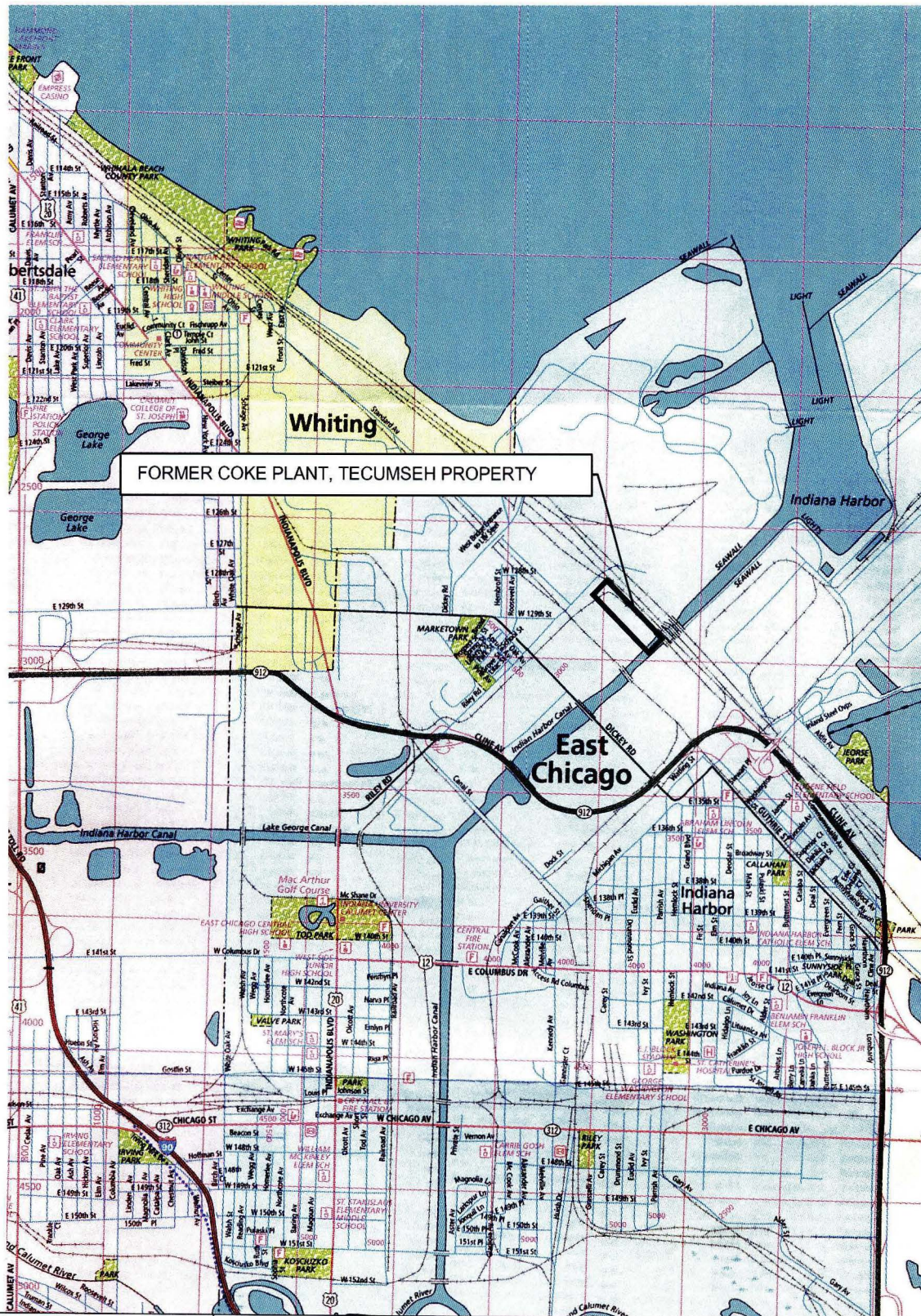




## FIGURES

- Figure 1-1 – Location Map
- Figure 1-2 – USGS Topographic and Site Layout Map
- Figure 4-1 – Investigation Decision Flow Chart
- Figure 5-1 – Site Layout and Proposed Sample Locations





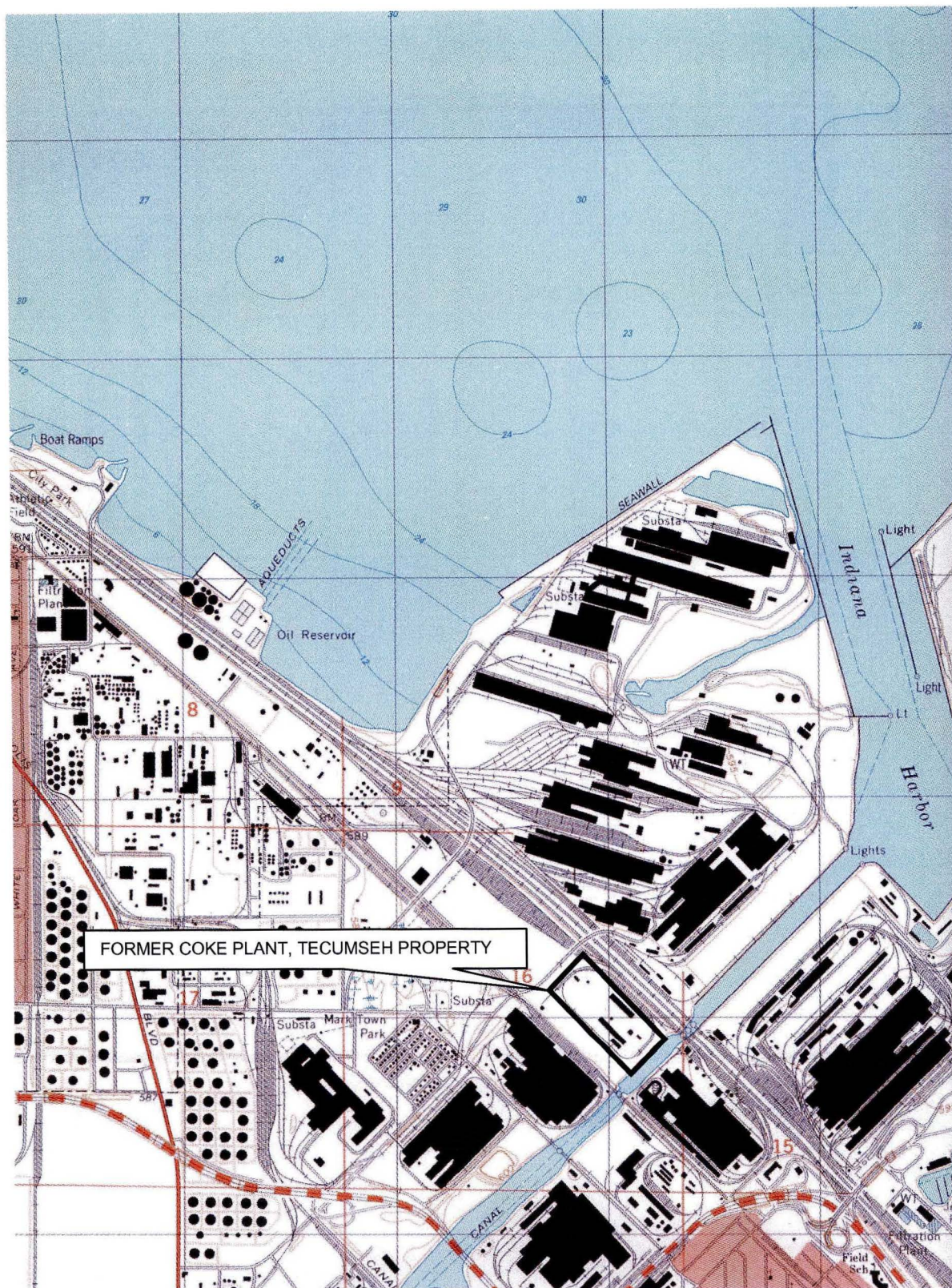
STS Consultants Ltd

### LOCATION MAP

(Source: Lake County Street Map,  
Rand McNally, 2001)

DRAWN BY: LLA	DATE: 02/28/2007
CHECKED BY: SCK	DATE: 02/28/2007
APPROVED BY: JMT	DATE: 02/28/2007
FILE NO.: FIG 1-1.doc	APPRX. SCALE: 1:3700
STS PROJECT NO. <b>1-08741-FF</b>	FIGURE NO. <b>1-1</b>





Source: USGS 7.5 Minute Topographic Map, Whiting, IN 1998



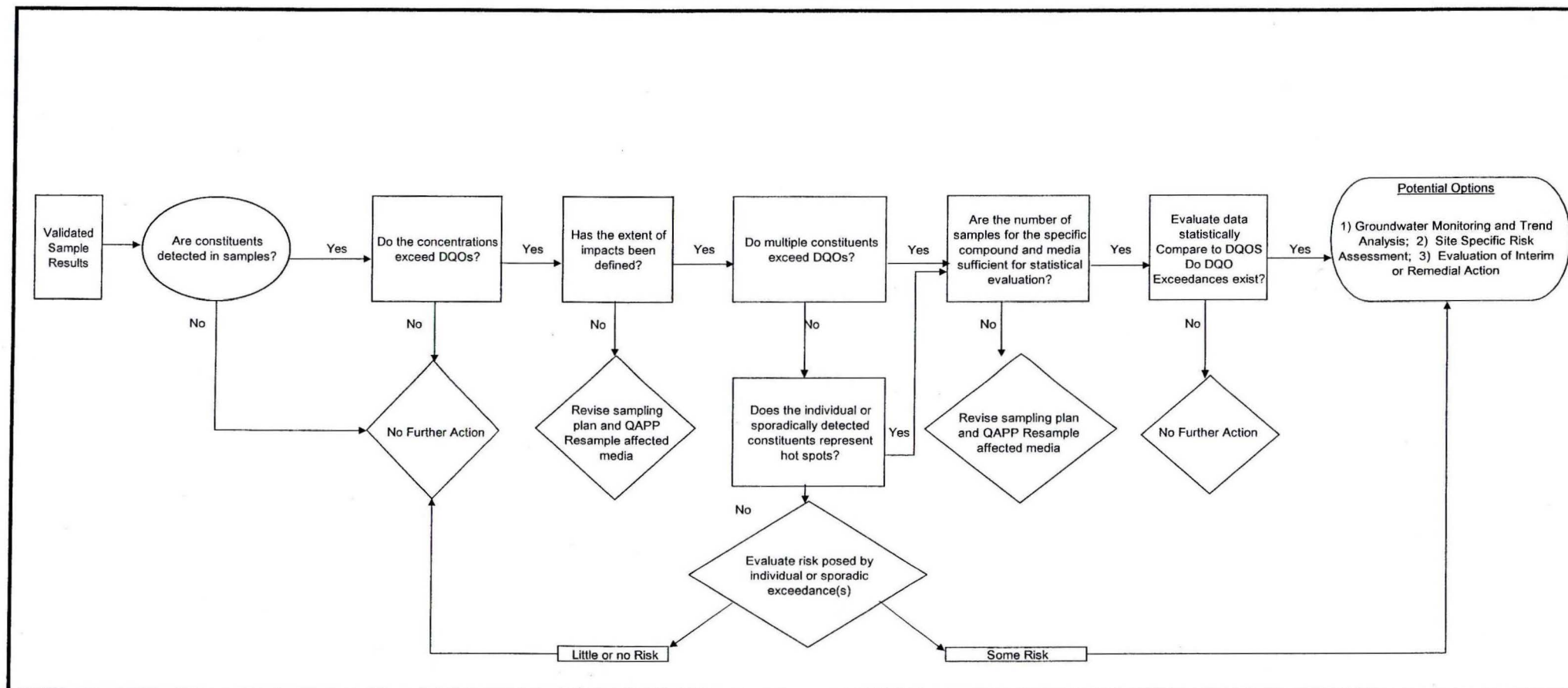
STS Consultants Ltd

USGS Topographic Map and Site Layout  
EAST CHICAGO, INDIANA

DRAWN BY: LLA	DATE: 02/28/2007
CHECKED BY: SCK	DATE: 02/28/2007
APPROVED BY: JMT	DATE: 02/28/2007
FILE NO.: FIG 3-1.doc	SCALE (Est.): 1:28000
STS PROJECT NO. <b>1-08741-FF</b>	FIGURE NO. <b>1-2</b>



Figure 4-1  
Investigation Decision Flow Chart  
Tecumseh Redevelopment, Inc. - Former Coke Plant

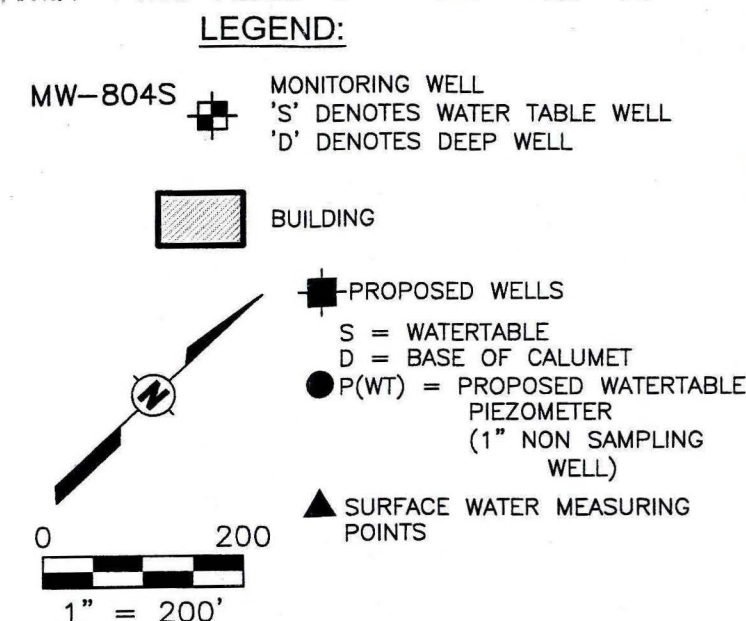
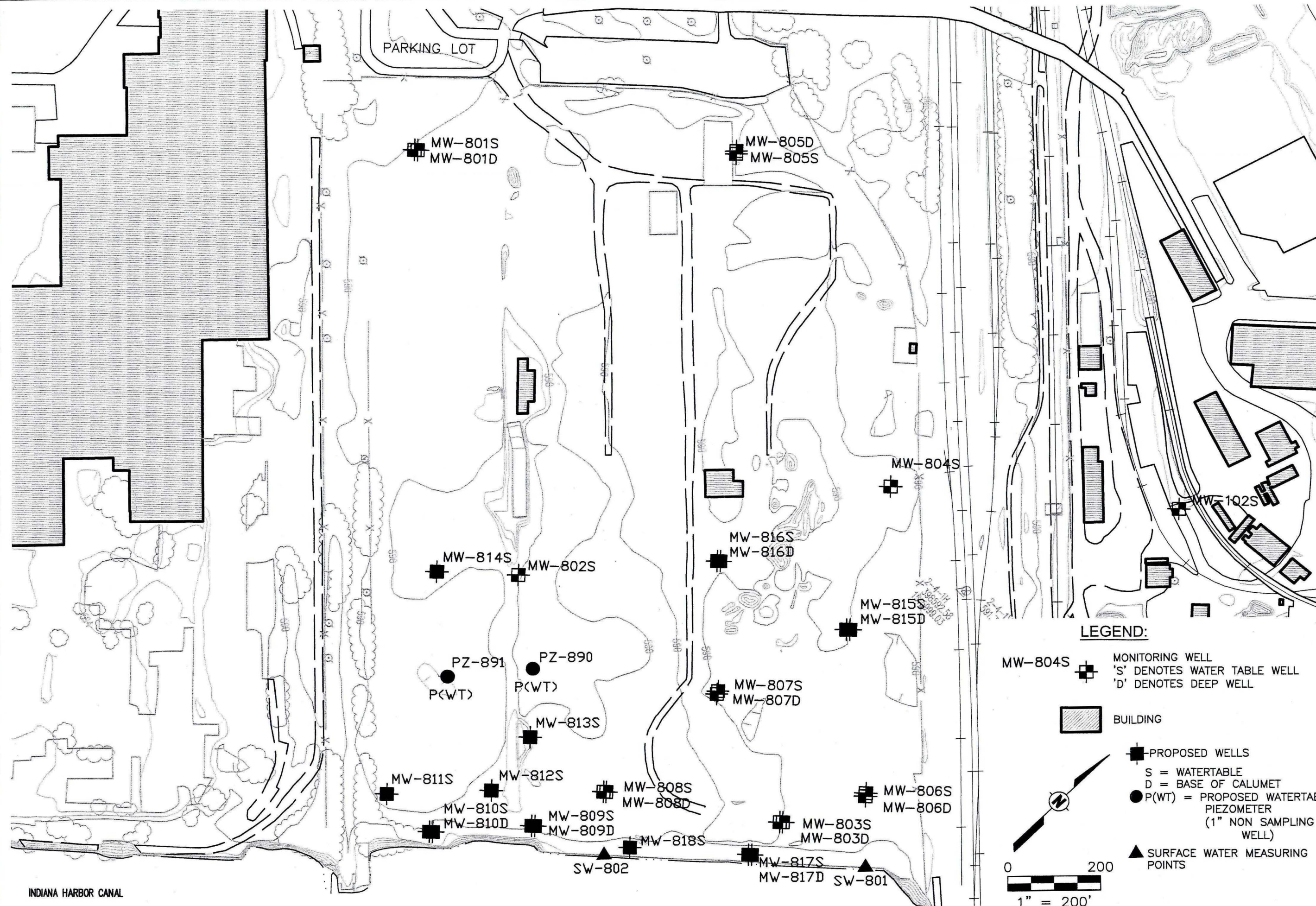






STS CONSULTANTS  
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Vernon Hills, IL 60061  
847-279-2500  
www.stsconsultants.com  
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FORMER COKE PLANT  
SITE LAYOUT & PROPOSED SAMPLE LOCATIONS  
TECUMSEH REDEVELOPMENT, INC.  
EAST CHICAGO, INDIANA



Drawn: CJH 3/6/2006

Checked: LLA 3/6/2006

Approved: JMT 3/6/2006

PROJECT  
NUMBER 108741FF

FIGURE  
NUMBER 5-1

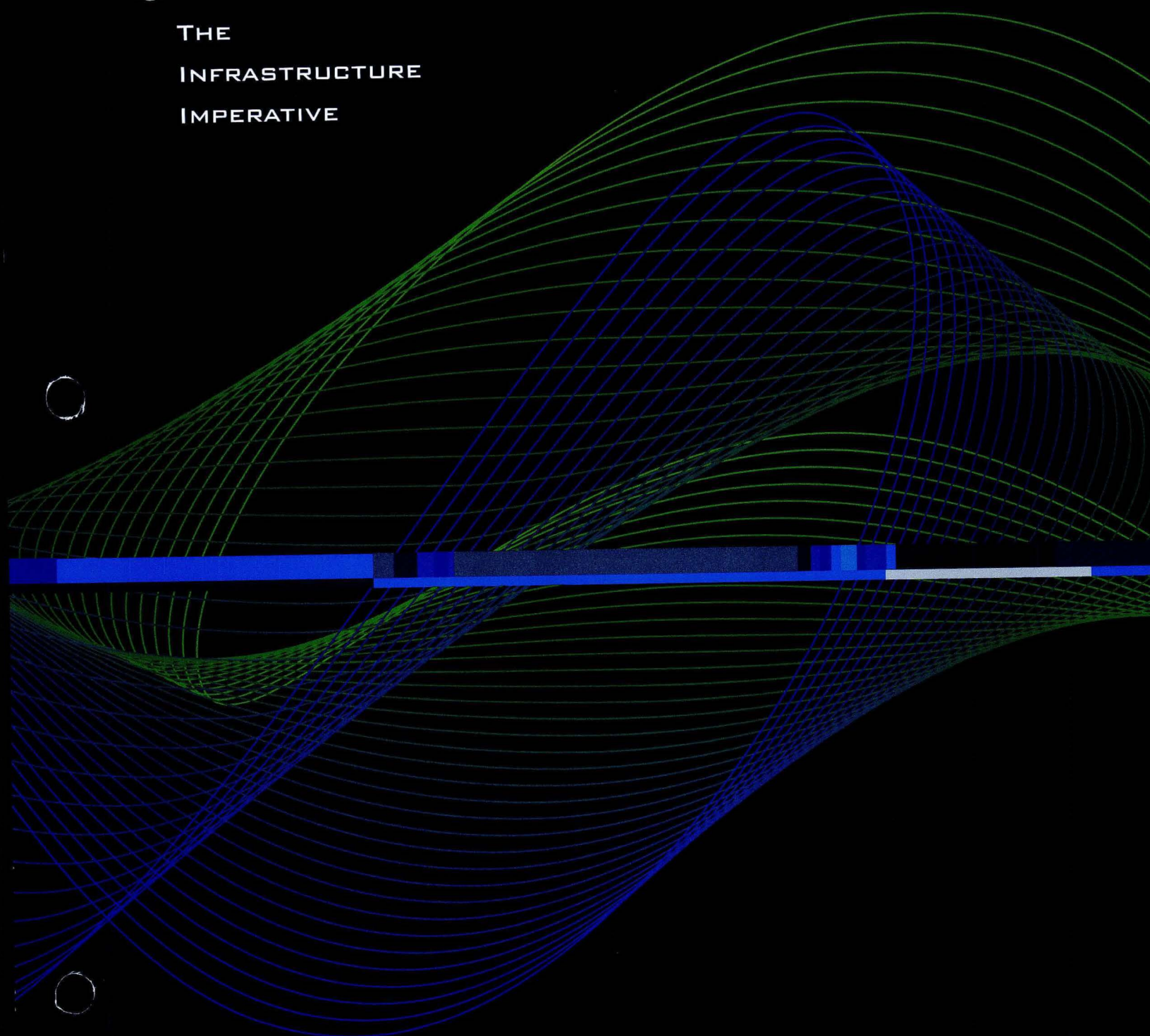




A



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**Appendix A**

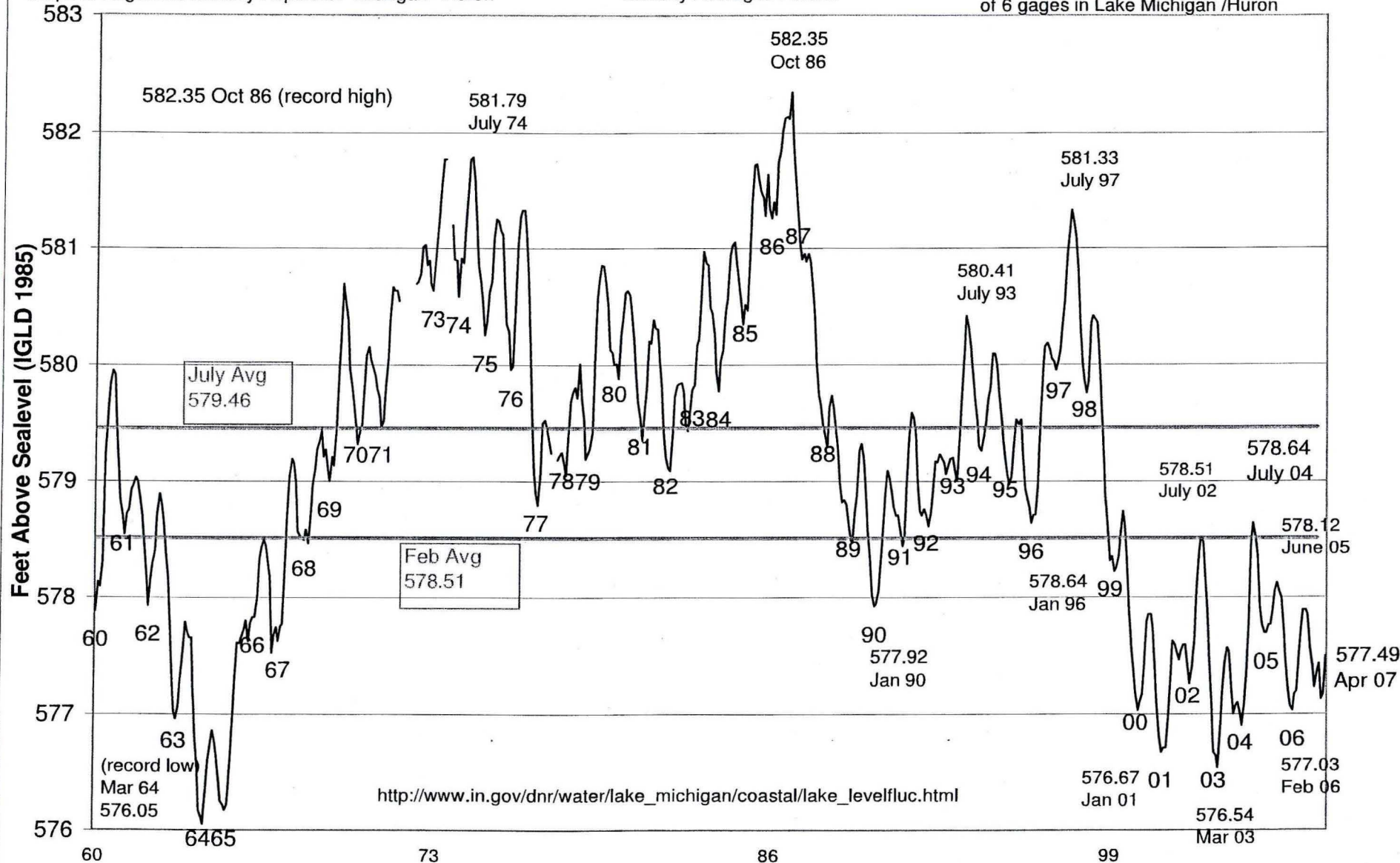
Lake Michigan Water Level Graph, 1960-2007

# LAKE MICHIGAN LAKE LEVELS 1960 - 2007

Corps of Engineers Monthly Report for "Michigan - Huron"

Monthly Averages Plotted

Note: All of these numbers are the average of 6 gages in Lake Michigan /Huron



YEARS - (January)

January 1960 to April 2007

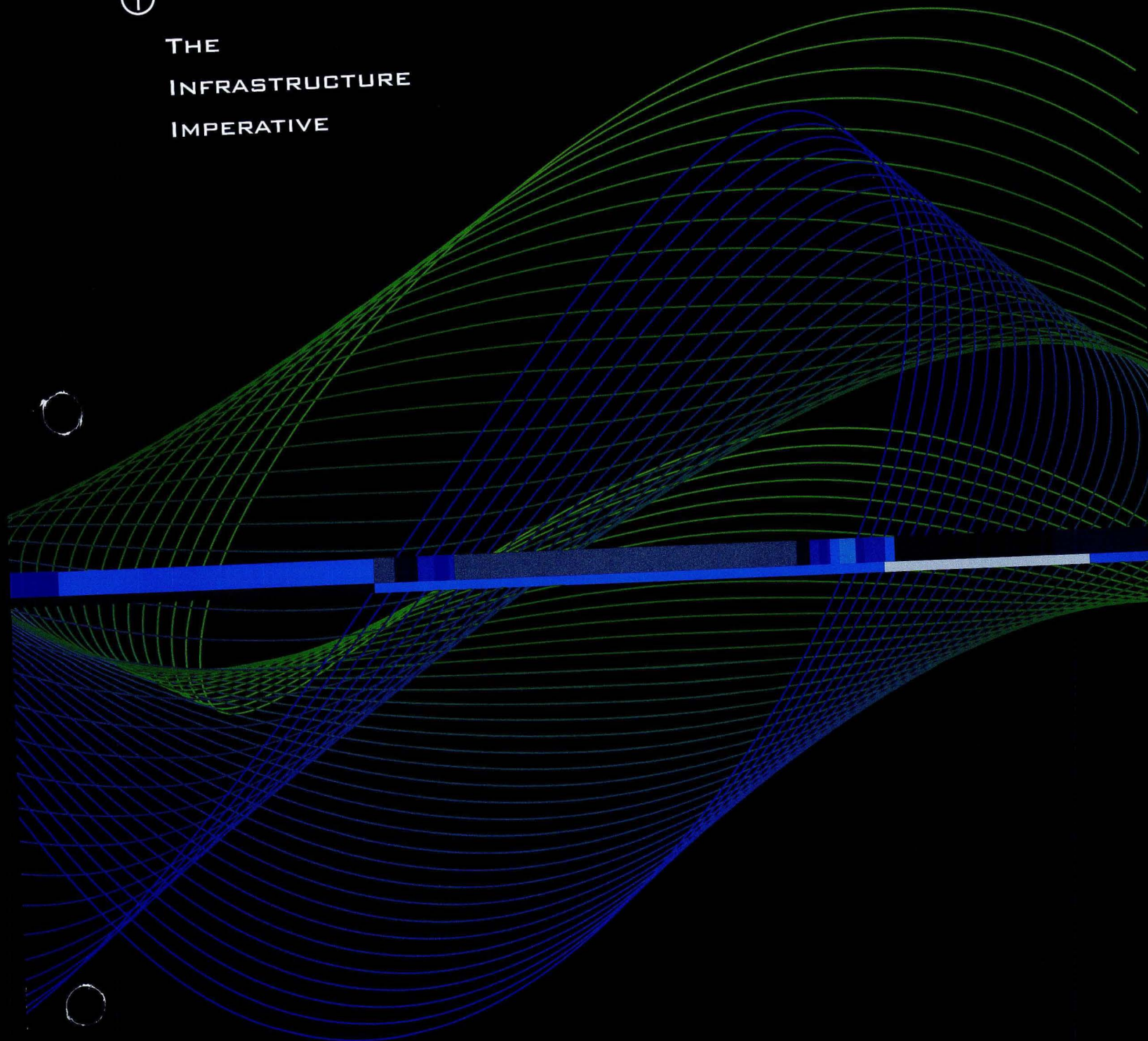




B



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## **Appendix B**

USGS Hobart Precipitation Station Data, 2006-2007

Water  
SourcesNational Water Information System:  
Web Interface

Data Category:

Site Information

Geographic Area:

United States

GO

# Site Map for the Nation

USGS 413218087151701 HOBART PRECIP STATION

Available data for this site

Site map

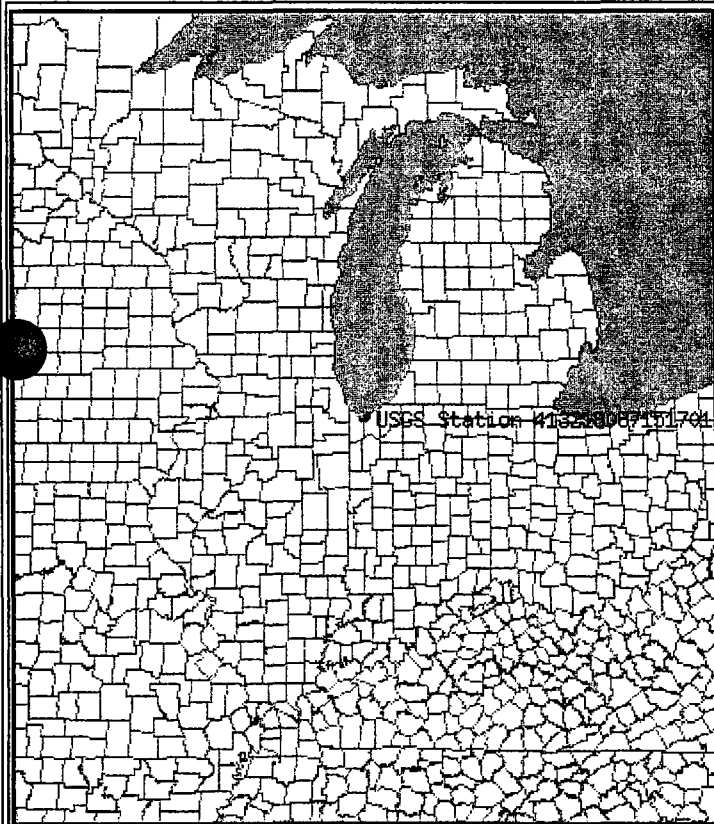
GO

Lake County, Indiana

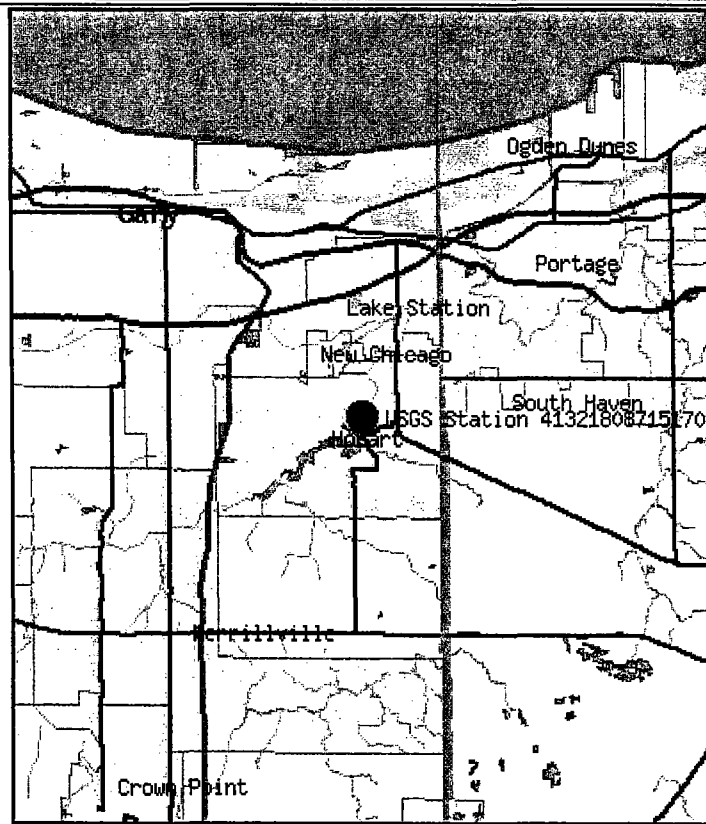
Hydrologic Unit Code 04040001

Latitude 41°32'18", Longitude 87°15'17" NAD27

Location of the site in USA.



Site map.



ZOOM IN 2X, 4X, 6X, 8X, or ZOOM OUT 2X, 4X, 6X, 8X.

Maps are generated by US Census Bureau TIGER Mapping Service.

[Questions about sites/data?](#)[Feedback on this web site](#)

NWIS Site Inventory for USA: Site Map

<http://waterdata.usgs.gov/nwis/nwismap?>

Retrieved on 2007-05-24 12:25:12 EDT

Department of the Interior, U.S. Geological Survey

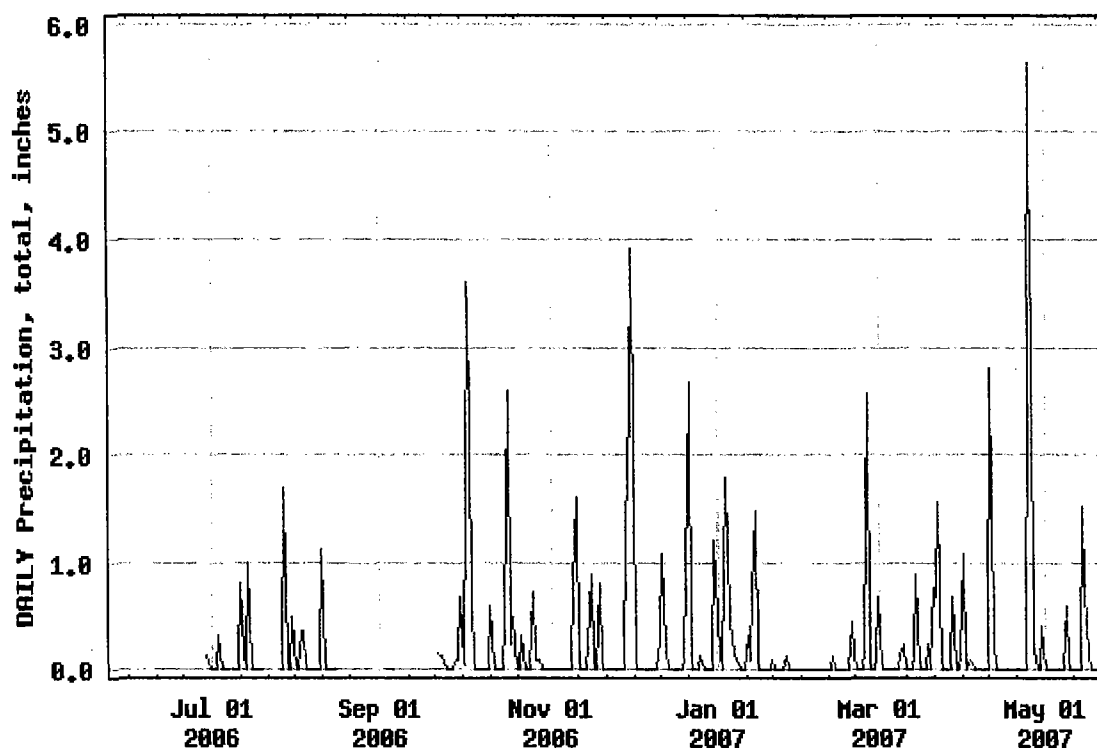
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1.16 0.72 ca03

[Top](#)[Explanation of terms](#)



## USGS 413218087151701 HOBART PRECIP STATION



# USGS 413218087151701 HOBART PRECIP STATION

Daily Sum Precipitation, total, inches (DD 01)													
DATE	May 2006	Jun 2006	Jul 2006	Aug 2006	Sep 2006	Oct 2006	Nov 2006	Dec 2006	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007
1		---	0.00	0.00	---	0.04	0.00	3.92	0.48	0.00	0.68	1.08	0.00
2		---	0.00	0.36	---	1.60	0.00	0.00	0.12	0.00	0.00	0.00	0.00
3		---	0.32	0.36	---	3.60	0.00	0.00	0.00	0.00	0.00	0.08	0.00
4		---	0.00	0.00	---	0.68	0.00	0.00	1.80	0.00	0.00	0.04	0.00
5		---	0.00	0.00	0.00	0.00	0.00	0.00	1.12	0.00	0.00	0.00	0.00
6		---	0.00	0.00	---	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00
7		---	---	0.00	---	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00
8		---	0.00	0.00	---	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
9		---	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.60
10		---	0.00	1.12	---	0.00	0.80	0.00	0.00	0.00	0.24	0.00	0.00
11		---	0.80	0.00	---	0.60	1.60	0.28	0.00	0.00	0.00	2.80	0.00
12		---	0.12	0.00	---	0.00	0.00	1.08	0.32	0.12	0.00	0.28	0.00
13		---	0.00	0.00	---	0.00	0.00	0.20	0.08	0.00	0.00	0.00	0.00
14		---	1.00	0.00	---	0.00	0.00	0.00	0.72	0.00	0.12	0.00	0.00
15		---	0.00	0.00	---	0.00	0.24	0.00	1.48	0.00	0.88	0.00	1.52
16		---	0.00	---	---	0.44	0.88	0.00	0.00	0.00	0.00	0.00	0.72
17		---	0.00	---	---	2.60	0.00	0.00	0.00	---	0.00	0.00	0.16
18		---	0.00	---	---	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19		---	0.00	---	---	0.48	0.80	0.00	0.00	0.44	0.24	0.00	0.00
20		---	---	---	---	0.00	0.00	0.08	0.00	0.12	0.00	0.00	0.00
21		---	---	---	---	0.00	0.00	1.72	0.08	0.00	0.76	0.00	0.00
22		---	---	---	0.16	0.32	0.00	2.68	0.00	0.00	0.68	0.00	0.00
23	0.00	---	---	---	0.12	0.00	0.00	0.00	0.00	0.00	1.56	0.00	0.00
24	---	---	---	---	0.04	0.00	0.00	0.00	0.00	0.20	0.00	0.00	
25	---	---	0.00	---	0.00	0.00	0.00	0.00	0.00	2.56	0.00	5.64	
26	---	---	0.00	---	0.00	0.72	0.00	0.12	0.12	0.00	0.00	2.92	
27	---	---	1.68	---	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.20	
28	---	0.12	0.00	---	0.08	0.08	0.00	0.00	0.00	0.08	0.68	0.00	
29	---	0.04	0.00	---	0.08	0.00	1.28	0.00	0.00		0.00	0.00	
30	---	0.00	0.48	---	0.68	0.00	2.44	0.00	0.00		0.00	0.4	
31	---		0.00	---		0.00		1.2	0.00		0.12		
Monthly Total		0.16	4.40	1.84	1.16	11.48	8.04	11.28	7.00	3.52	6.08	13.44	3.00
COUNT		3	25	15	10	31	30	31	31	27	31	30	23
MAX		0.12	1.68	1.12	0.68	3.6	2.44	3.92	1.8	2.56	1.56	5.64	1.52
MIN		0	0	0	0	0	0	0	0	0	0	0	0

Note: All data listed above is considered provisional and subject to revision.

Annual Precipitation June 06-May 07

71.4



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

DE-9J

January 12, 2005

**VIA FACSIMILE AND CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

James Flannery  
ISG Indiana Harbor Inc.  
Tecumseh Redevelopment Inc.  
3001 Dickey Road  
East Chicago, Indiana 46312-1610

Re: In the Matter of ISG Indiana Harbor Inc. and Tecumseh Redevelopment Inc.  
RCRA Docket No.: R3013-5-03-002  
Revised Sampling and Analysis Work Plans (Revision 2)

Dear Mr. Flannery:

We have completed our review of your revised proposal, dated December 4, 2004. This workplan was required under the administrative order referenced above that U.S. EPA issued under Section 3013 of the Resource Conservation and Recovery Act (RCRA). The purpose of this review was to determine if these workplans were adequately revised in response to EPA's comments dated August 6, 2004, and discussions conducted in an August 11, 2004, meeting between EPA and ISG/Tecumseh (and their respective consultants). We are enclosing a set of review comments (see Enclosure 1). We hope that you will find them to be helpful. The numbering used in this enclosure follows the numeric order presented in the August 6, 2004, comments on Revision 1 of the work plans.

Your proposal is hereby approved with modifications as described below. This letter supersedes our letter of August 6, 2004. The necessary monitoring, testing and analysis has two parts. The first part includes all of the work described in your December 4, 2004 proposal with the following three modifications:

1. ISG/Tecumseh shall conduct two directed surface/subsurface soil borings at each of solid

waste management units (SWMUs) 10, 23, and 26. *(See Enclosure 1, Comment 4 for the rationale for this modification.)*

2. ISG/Tecumseh shall collect volatile organic constituent (VOC) samples from groundwater wells by using electric submersible or bladder pumps, instead of peristaltic pumps or bailers. *(See Enclosure 1, Comment 24 for the rationale for this modification).*
3. ISG/Tecumseh shall redevelop existing wells: MW-P1S, MW-P2D, MW-P4S, MW-P5S, MW-P6S, and MW-P7D at least two weeks prior to the collection of groundwater samples. *(See Enclosure 1, Comment 50 for the rationale for this modification).*

In accordance with Paragraph 60 of the order, you must start the work within ten days of the date of this letter, that is no later than January 22, 2005. The work must be completed in accordance with the approved schedule contained in Table 1-7 of your workplan. Accordingly, the completed report must be submitted within 67 weeks after January 22, 2005. Thus, the report is due no later than April 28, 2006. Section 3013 (e) of RCRA and 40 C.F.R. Part 19, as amended by 69 Fed. Reg. 7121 (Feb. 13, 2004), allow U.S. EPA to assess a penalty of up to \$6,500 per day for noncompliance with a Section 3013 order after March 15, 2004. In addition, Section 3013(e) allows U.S. EPA to bring a civil action to require compliance with a Section 3013 order.

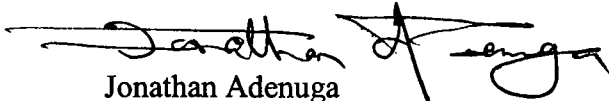
The second part includes additional groundwater monitoring, testing, analysis and reporting that is reasonable and necessary to ascertain the nature and extent of the presence of hazardous wastes and/or the release of any waste at or from the referenced facility. Accordingly, your proposal is hereby modified as follows:

4. Samples from Wells Number MW-910S through MW-915S, MW-910M, MW-910D through MW-912D, MW-P5D, MW-914D and MW-915D must be collected, tested and analyzed for chemical constituents in Table 1-2, and the results must be reported in accordance with the same procedures and schedules that apply to the other groundwater sampling that is described in Volume 4 your proposal. *(See Enclosure 1, Comment 13 for the rationale for this modification).*

Since the second part of the monitoring analysis and testing work has already been discussed with ISG/Tecumseh representatives but has been excluded from your proposal, it appears that you are refusing to perform this part of the work. We hope you will reconsider that decision. In addition to the enforcement authority available under RCRA Section 3013(e) described above, Section 3013(d) allows U.S. EPA to conduct the necessary monitoring, analysis and testing or authorize another person to carry out the work and to seek reimbursement from the owner or operator for the costs of such activity. If you agree to carry out the second part of the work, you should notify us in writing no later than January 20, 2005. If we do not hear from you by that date, we may arrange to have our contractor perform the second part of the work and seek reimbursement from ISG/Tecumseh and/or bring a civil action against ISG/Tecumseh.

A statement about the collection and use of background samples is also included as Enclosure 2 to this letter. This statement was developed in response to your request in our meeting of November 9, 2004. If you have any further questions or concerns about background samples, we can continue to discuss them while the monitoring, reporting and testing is underway. Please contact me at (312) 886-7954 if you have any further questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathan Adenuga", with a stylized flourish at the end.

Jonathan Adenuga  
U.S. EPA Project Manager

encl

cc: Vincent Atriano, Esq., Squire, Souders & Dempsey LLP  
bcc: Christine Liszewski



## **ENCLOSURE 1**

### **COMMENTS ON THE DECEMBER 2004 WORK PLANS (REVISION 2) ISG INDIANA HARBOR & TECUMSEH REDEVELOPMENT EAST CHICAGO, INDIANA**

#### **I. GENERAL COMMENTS**

- 1 - 3. The responses to these comments are acceptable.
4. General Comment No. 4 of the EPA review (dated August 6, 2004) of the Revision 1 work plan required directed soil borings in solid waste management units (SWMUs) 10, 23, and 26. The comment specified "two directed surface/subsurface soil borings at each unit" at locations adjacent to where potential wastes were routinely deposited "based on knowledge of SWMU activities and visual indications of surface impacts." Although ISG agreed to address this comment at the meeting held with EPA on August 11, 2004, Volume 1 has not been revised to include directed surface/subsurface soil boring sampling at these SWMUs.

#### **SPECIFIC COMMENTS**

##### **Soil Sampling and Analysis Plan (Vol. 1)**

- 5 - 10. The responses to these comments are acceptable.

##### **Sediment Sampling and Analysis (Vol. 2)**

- 11 - 12. The responses to these comments are acceptable.

##### **Hydrogeologic Conditions Work Plan (Vol. 3)**

##### **Volume 3, Section 5.10.2, Non-SWMU US EPA Requested Monitoring Wells, Page 7**

13. The revised Hydrogeologic Conditions Work Plan specifies on Page 7, Section 5.10.2, that 13 non-SWMU wells requested by EPA will be installed to collect perimeter and interior hydrogeologic information. These wells include six water table wells (MW-910S through 915S), one intermediate well (MW-910M), and six deep wells (MW-910D through MW-912D, MW-P5D, MW-914D, and MW-915D). However, the work plan states that, "ISG-IH and Tecumseh have agreed to install these monitoring wells only for water level measurements and physical aquifer characteristics such as hydraulic conductivity." This proposal to exclude water quality sampling at these background wells

is not acceptable. Characterization of these areas in terms of head distribution, hydraulic conductivity, and water quality are central to developing a meaningful conceptual model of system dynamics, particularly considering the large size of the facility and the scarcity of analytical data available for characterizing site conditions.

14 - 20 The responses to these comments are acceptable.

#### **Groundwater Sampling and Analysis Work Plan (Vol. 4)**

21 - 22 The responses to these comments are acceptable.

#### **Volume 4, Section 4.1.4, Defining the Boundaries of the Study, Page 3**

23. The revision to Section 4.1.4, Page 3, is adequate. It states that, "under a revised work plan and after approval by US EPA, subsequent sampling events will be conducted." However, this revision is not apparent in Table 1-1, which shows the investigation decision flow chart for the SWMUs. It would have been more clear if Table 1-1 had been footnoted to indicate the requirement of subsequent groundwater sampling at SWMU and non-SWMU wells.

#### **Volume 4, Section 6.2, Groundwater Sample Procedures, Page 1**

24. At the meeting held on August 11, 2004, EPA and ISG discussed the potential disadvantage of using a peristaltic pumps to collect volatile organic compound (VOC) samples. EPA stated that more representative VOC sampling results could be obtained through use of electric submersible or bladder pumps. It was agreed that ISG would either demonstrate that use of a peristaltic pump would not result in significant under-reporting of VOC concentrations at the facility (through an on-site field comparison with other pumps) or would revise the work plans to include VOC sample collection by electric submersible or bladder pumps. However, the revised work plan specifies sampling via a peristaltic pump or bailer.
25. The response to this comment is acceptable.

#### **Human Health and Ecological Risk Assessment Planning Steps (Vols. 1 & 2)**

##### **General Comments**

26 - 27 The responses to these comments are acceptable.

##### **Specific Comments**

28 - 39 The responses to these comments are acceptable.

#### **Quality Assurance Project Plan (Vol. 5)**

## **General Comments**

40. Based on the August 11, 2004, meeting, no historical analytical data are available (only geotechnical data). Therefore, this comment is no longer applicable.
41. Although the QAPP tables have been updated and expanded in response to EPA's earlier comment, numerous inconsistencies and references to outdated methods still remain. Specific errors identified during this review are listed below by table number.

### **Table 1-2:**

- The preparation method to be used on solid samples being analyzed for metals content should be listed as SW3050B.
- The analytical method currently listed for determining selenium content in solid samples (SW7740A) is incorrect. The table should reference either method SW7740 or SW7741A.
- As noted in an earlier comment, the reference to method SW9030 for sulfide analysis should be corrected to list method SW9030B.
- Sample preparation method SW3550 is listed twice for polynuclear aromatic hydrocarbon compounds, which are to be analyzed via method SW8270C-SIM.
- Although Table 4-1 provides sample container, method, preservation, and holding time requirements for measuring alkalinity in solid samples, this parameter has not been listed on Table 1-2. The tables should have consistently identified the appropriate analytical parameters.

### **Table 1-3:**

- The analytical method currently listed for determining selenium content in solid samples (SW7740A) is incorrect. The table should have referenced either method SW7740 or SW7741A.
- Analytical methods presented in Table 1-3 for sulfide, chloride, and chemical oxygen demand are inconsistent with the methods indicated on Table 4-1 and appear to have been inadvertently switched for the latter two parameters. This table should have reflected the actual methods to be used for measuring "other" parameters during the ISG investigation.

**Table 1-4:**

- The field procedures for soil classification and hydraulic conductivity have not been properly identified in this table.

We recommend that the Respondents reconcile the inconsistencies in the QAPP to avoid confusion among the field team during implementation of the planned field activities.

42. The response to this comment is acceptable.

**Specific Comments**

43. The response to this comment is acceptable.

**Volume 5, Table of Contents, Page 9**

44. The response to this comment is acceptable.

45. The response to this comment is acceptable.

46. The response to this comment is acceptable.

**Volume 5, Section 1.5.1, Rationale of Selected Sampling Locations, Page 35**

47. The response to this comment is partially acceptable in that the requested information is provided in Tables 1-5 and 1-6. However, the total sample quantities between the two tables do not match. The tables should have consistently reflected the full scope of this investigation.

48. The response to this comment is acceptable.

49. The response to this comment is acceptable.

**Additional Comment Relating to Discussions at August 11, 2005, EPA/ISG Meeting**

**Volume 3, Sections 5.9 and 5.10, Background Wells and Non-SWMU Wells, Pages 6 and 7**

50. Sections 5.9 and 5.10 specify the wells that will be used to characterize groundwater conditions at background and non-SWMU locations. The wells, which include proposed new wells and existing wells, are summarized in Table 5-2. There are six existing wells: MW-P1S, MW-P2D, MW-P4S, MW-P5S, MW-P6S, and MW-P7D. EPA and ISG agreed at the August 11, 2004, meeting that these existing wells would be redeveloped prior to sampling; however, the revised work plan does not address this issue. The work plan should have specified that all existing wells will be redeveloped at least two weeks prior to the collection of groundwater samples.

**Volume 4, Section 6.2, Groundwater Sample Procedures, Page 1**

51. The work plan states that, "purging will be considered complete when values of pH, temperature, specific conductance, and DO are within 10% for three consecutive readings." However, according to EPA guidance captured in *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, Ground Water Forum Issue Paper, EPA 542-S-02-001, May 2002*, recommended stabilization criteria are as follows: pH ( $\pm 0.1$ ), oxidation-reduction potential ( $\pm 3\%$ ), specific conductance ( $\pm 3\%$ ), turbidity ( $\pm 10\%$ , if turbidity  $> 10$  NTUs), and dissolved oxygen ( $\pm 0.3$  mg/L). In addition, the work plan specifies purging a minimum of three well volumes, which is typically not specified for low-flow sampling and appears to be unnecessary. For low-flow sampling, sampling may proceed once parameter stabilization is complete.

ISG INDIANA HARBOR FACILITY/TECUMSEH REDEVELOPMENT  
COLLECTION AND USE OF BACKGROUND SAMPLES

U.S. EPA's *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*, dated September 2002, provides the following definitions for "naturally occurring background" and "anthropogenic background":

Background: Substances or locations that are not influenced by the releases from a site and are usually described as naturally occurring or anthropogenic: (1) Naturally occurring substances present in the environment in forms that have not been influenced by human activity. (2) Anthropogenic substances are natural and human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA site in question).

U.S. EPA's Advance Notice of Proposed Rulemaking on *Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities*, 61 Federal Register 19432, published on May 1, 1996, includes the following statement:

Consistent with the CERCLA program, in the RCRA corrective action program EPA intends to clean up sites in a manner consistent with available, protective, risk-based media cleanup standards (e.g., MCLs and state cleanup standards) or, when such standards do not exist, to clean up to protective media cleanup standards developed for the site in question (e.g., through a site-specific risk assessment).

ISG/Tecumseh has proposed collecting 12 soil samples of on-site slag-fill material, and groundwater samples at three slag-fill well locations at the Indiana Harbor facility to establish the range of concentrations in on-site fill materials and groundwater which have not been affected by other facility activities, such as leaks or spills for example. This information is expected to be useful in making risk management decisions. We have not objected to ISG/Tecumseh's use of the word "background" in this context, but obviously these samples are intended to characterize the slag-fill materials specifically related to the site in question.

Paragraph 1 in the attachment to U.S. EPA's August 27, 2004 letter, includes the statement that "EPA will review the background data and make a determination whether they are actually representative of background conditions." In other words, if organic constituents are detected in these samples, or if the concentrations of inorganic constituents are unusually high, then we would have to reassess whether these sample locations were actually unaffected by other facility activities, such as leaks or spills.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

November 17, 2004

REPLY TO THE ATTENTION OF:

James Flannery  
ISG Indiana Harbor Inc.  
Tecumseh Redevelopment Inc.  
3001 Dickey Road  
East Chicago, Indiana 46312-1610

Re: In the Matter of ISG Indiana Harbor Inc. and Tecumseh Redevelopment Inc.  
RCRA Docket No.: R3013-5-03-002  
Revised Sampling and Analysis Work Plans

Dear Mr. Flannery:

In response to your September 9, 2004, letter regarding your request for an example of a tabulated description and itemization of all specific tasks to be performed, the United States Environmental Protection Agency has enclosed an example of this table for your use. Please contact me at (312) 886-7954, if you have any questions.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jonathan Adenuga".

Jonathan Adenuga  
Enforcement and Compliance Assurance Branch  
Corrective Action Section  
Waste, Pesticides and Toxics Division

Attachment.

## Example Table

Sediment Sampling/Analysis			
AOC 1	3	3	Delineate potential contaminant impacts to on-site sediment
Surface Water Sampling/Analysis			
AOC 1	3	3	Delineate potential contaminant impacts to on-site surface water
Groundwater Sampling/Analysis			
On site, new alluvial well, adjacent to MW-1	1	1	Replacement well for MW-1 to delineate contaminant concentrations along eastern site boundary
Off site, new perched well, southeast of MW-2	1	1	Determine contaminant concentrations downgradient of the wastewater treatment ponds
Off site, new alluvial well, northeast of well MW-3	1	5	Determine contaminant concentrations upgradient of contaminant hotspot
Off site, new alluvial well, west of OFFMW-3/4	1	5	Determine contaminant concentrations cross gradient of OFFMW-3 and OFFMW-4
Off site, new alluvial well, south of OFFMW-3/4	1	5	Determine contaminant concentrations downgradient of OFFMW-3 and OFFMW-4
Off site, new alluvial well, south of OFFMW-1/2	1	5	Determine contaminant concentrations downgradient of OFFMW-1 and OFFMW-2
Off site, new alluvial well, southeast of OFFMW-1/2	1	5	Determine contaminant concentrations downgradient of site
Off site, new alluvial well, east of OFFMW-1/2	1	5	Determine contaminant concentrations downgradient of site
On-site, perched zone, existing monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-8, and MW-9	9	9	Determine contaminant concentrations in existing on-site monitoring wells



Groundwater Sampling/Analysis			
On-site, upper alluvium, existing monitoring wells MW-6, MW-7, MW-3, MW-4, MW-5, MW-6, MW-1, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, and MW-18	16	16	Determine contaminant concentrations in existing on-site monitoring wells
On site, lower alluvium, existing monitoring wells MW-7B and MW-4B	2	2	Determine contaminant concentrations in existing on-site monitoring wells
Off site and downgradient, upper alluvium, existing wells OFFMW-2 and OFFMW-4	2	2	Determine contaminant concentrations in existing off-site monitoring wells
Off site and downgradient, lower alluvium, existing wells OFFMW-1 and OFFMW-3 and agricultural wells AGI-1, AGI-2, AGI-5, AGI-6, and AGI-7	7	7	Determine contaminant concentrations in existing off-site monitoring wells

## Example Template

Groundwater Sampling/Analysis			
A			
B			
C			
D			
E			
F			
G			
H			
Background			
Sediment Sampling/Analysis			
A			
B			
C			
D			
E			
F			
G			
H			
Background			
Surface Water Sampling/Analysis			
A			
B			
C			
D			
E			
F			
G			
H			
Background			
Surface Soil Sampling/Analysis			
A			
B			
C			
D			
E			
F			
G			
H			
Background			

Subsurface Soil Sampling/Analysis			
A			
B			
C			
D			
E			
F			
G			
H			
Background			



**INTERNATIONAL STEEL GROUP INC.**

4020 KINROSS LAKES PARKWAY  
RICHFIELD, OH 44286-9000  
330-659-9100

November 2, 2004

Mr. Jonathan Adenuga  
Project Coordinator  
U.S. Environmental Protection Agency, Region 5  
RCRA Enforcement Branch (DE-9J)  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

**Re:   Field Investigation at the Razed Coke Plant  
      Tecumseh Redevelopment Inc. - East Chicago, Indiana**

Dear Mr. Adenuga:

Tecumseh Redevelopment Inc. (Tecumseh) presently intends to initiate field investigations in the area of a razed coke plant on its property in East Chicago, Indiana. The areas to be investigated include those identified as the AOC and SWMU #65 in the RCRA §3013 order (Order) issued to Tecumseh and ISG Indiana Harbor Inc. on October 23, 2003. The work will proceed according to the technical standards contained in the submittals made to USEPA by Tecumseh and ISG Indiana Harbor Inc in response to the Order. Field work is expected to begin about November 8, 2004. Monitoring wells (5 water table and 3 deep wells) will be installed at the locations proposed in the revised Groundwater Sampling and Analysis Plan (May 19, 2004). As outlined in the Soil Sampling and Analysis Plan (May 19, 2004), the installation of the wells also will include the collection of both surface and subsurface soil samples. It is anticipated that the wells will be installed as proposed in the work plans with the exception that the deep wells will be installed using 3-foot screen instead of the 5-foot screen originally proposed. It is anticipated that the monitoring well installation and soil sampling efforts will take approximately 8 days to complete. If the current field investigation plans change materially you will be advised accordingly.

Tecumseh is initiating this work now in an effort to expedite assessment of the coke plant area. In addition to addressing the two specific areas noted above, the assessment is a first step in moving the property into redevelopment and productive use. The work will be conducted consistent with the technical standards incorporated into the Tecumseh and ISG Indiana Harbor Inc submittals referenced above as USEPA's letter to James Flannery dated August 6, 2004 indicates acceptance of these standards. I am, however, aware that the work

Mr. Jonathan Adenduga  
November 2, 2004  
Page 2

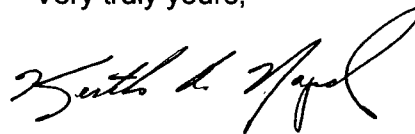
plans are not yet approved. Although USEPA states in the August 6 letter that it is providing a conditional approval contingent on ISG Indiana Harbor providing USEPA with additional information, the agency further states "the remaining issues identified in the attachment must be addressed prior to approval of these work plans". It is also important to note that as the work plans have not yet been approved, none of the timelines contained in the submittals are now in effect. Once the technical aspects of a work plan are approved, revised work schedules and timelines can be developed.

Although Tecumseh and ISG Indiana Harbor continue to express the concerns raised both in Mr Atriano's letter to USEPA dated May 19, 2004 and in subsequent conversations I have had with the Agency, we look forward to resolving those concerns cooperatively so that appropriate work at the East Chicago location can be initiated and completed effectively.

If you have any questions regarding this letter or the proposed activities described above, please feel free to contact me at (330) 659-9165.

Thank you for your cooperation.

Very truly yours,



Keith A. Nagel,  
For Tecumseh Redevelopment Inc. and  
ISG Indiana Harbor Inc.

KAN/klv

cc: Jerry Phillips



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

August 27, 2004

REPLY TO THE ATTENTION OF:

**VIA FACSIMILE AND CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

James Flannery  
ISG Indiana Harbor Inc.  
Tecumseh Redevelopment Inc.  
3001 Dickey Road  
East Chicago, Indiana 46312-1610

Re: In the Matter of ISG Indiana Harbor Inc. and Tecumseh Redevelopment Inc.  
RCRA Docket No.: R3013-5-03-002  
Revised Sampling and Analysis Work Plans

Dear Mr. Flannery:

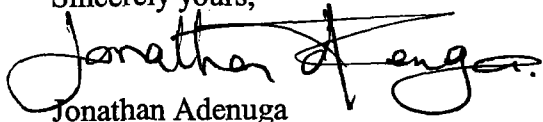
The United States Environmental Protection Agency (U.S. EPA) is providing you with revised technical comments to the proposed monitoring, testing, analysis and reporting Work plans submitted for the ISG facility. These comments were prepared based on the August 11, 2004 meeting held in Chicago and further discussed in a conference call with ISG on August 26, 2004. These revised technical comments addresses only the hydrogeological and groundwater Sampling issues that were outstanding during the August meeting. It is also our understanding that all other groundwater monitoring and Analysis issues not discussed in this revised comments are resolved. In addition, all issues relating to Soil Sampling and Analysis Plan, Human Health and Ecological Risk Assessment Plans and Quality Assurance Plans discussed during the August meeting are also resolved.

You must respond in writing to these revised technical comments within 7 days of receipt of this letter and Attachment indicating whether you agree or disagree with these comments. If you agree with these comments, ISG should submit to U.S. EPA within 10 days of receipt of this letter an addendum to all Work Plans addressing all items resolved during the August 11, 2004 meeting and the comments in this Attachment.

Please contact me at (312) 886-7954 if you have any questions.

Sincerely yours,

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jonathan Adenuga". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

Jonathan Adenuga  
Enforcement and Compliance Assurance Branch  
Corrective Action Section  
Waste, Pesticides and Toxics Division

cc: Vincent Atriano, Esq.  
Squire, Sanders & Dempsey, LLP

bcc: Christine Liszewski, ORC

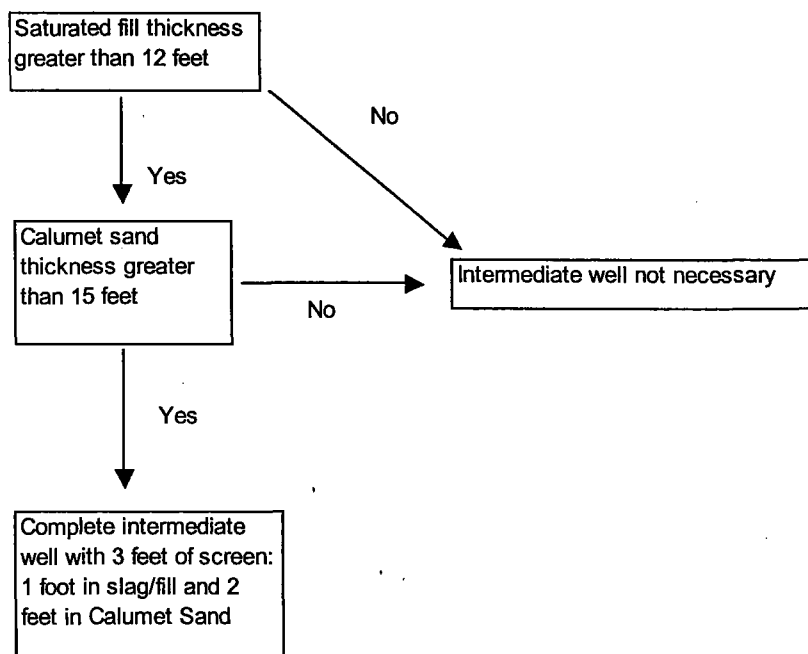
## ATTACHMENT

1. ISG may develop area background groundwater concentrations based on data it obtains from the 901 group and 902 group monitoring wells. It is understood that these are expected to be some of the areas at the facility least impacted by anthropogenic activities. However, due to the prevalence of fill materials (especially slag) placed in the general area, constituents related to that filling could be detected in groundwater at these wells. ISG must discuss any indications of potential impairments at the background wells in the investigation report it submits under the 3013 Order, and how these impairments might affect use of these wells to develop background groundwater concentrations for the facility. EPA will review the background data and make a determination whether they are actually representative of background conditions.

In addition, it will be necessary for ISG to compare groundwater data against appropriate risk-based criteria. The risk-based preliminary remediation goals may be published federal or Indiana Department of Environmental Management (IDEM) standards, or they may be calculated, site-specific risk-based values. Use of background data may not necessarily preclude ISG from conducting corrective measures to mitigate risk.



2. Intermediate monitoring wells screened in the Calumet Sand Aquifer are required at certain locations to fully and adequately assess groundwater quality and vertical head distribution throughout the saturated soil thickness. At a minimum, intermediate wells should be installed at all non-solid waste management unit (SWMU) monitoring well locations where the saturated fill thickness is greater than 12 feet and the Calumet Sand thickness is greater than 15 feet, as illustrated in this decision flowchart:



Note: Assumes water table wells are completed with 4 feet of screen above the water table and 6 feet below.

This will ensure that the screened intervals do not overlap and that water quality and head data are obtained from separate, discrete intervals. The flowchart assumes a 10-foot screen (four feet above the water table and six feet below) for the water table well, a three-foot intermediate well screen positioned across the slag/fill and Calumet Sand contact, and a three-foot screen seated one foot into the underlying clay unit for the deep well. Based on preliminary review of the fill and sand thickness and water depth estimates from the isopach maps in ISG's Revised Work Plan, it appears that intermediate wells may be required at the following locations: A7, A13, and MW901/MW901P. The actual number of intermediate wells required will be based on field conditions encountered during the site investigation, in accordance with the above decision flowchart.

3. Based on ISG's Revised Work Plan, EPA's Comment #13 attached to the August 6, 2004, letter, and the conference call held on August 26, 2004, between EPA and ISG, EPA requests that the following non-SWMU monitoring wells be installed and sampled:
- A monitoring well nest at Location A7, to consist of a water table well, an intermediate well (if required), and a deep well. Installation of an intermediate well will be

evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field.

- A monitoring well nest at Location A9, to consist of a water table well, a deep well, and an intermediate well, if required. Installation of an intermediate well will be evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field.
- A monitoring well nest at Location A13, to consist of a water table well, an intermediate well (if required), and a deep well. Installation of an intermediate well will be evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field. The proposed water table well and deep well south of this location and north of the Terminal Lagoon shown on ISG's Draft Figure 1-2 dated August 19, 2004 may be eliminated.
- A monitoring well nest at Location A14, to consist of a water table well, a deep well, and an intermediate well, if required. Installation of an intermediate well will be evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field.
- A deep monitoring well nested with the existing water table well (P5) shown east of Location B6 and an intermediate well, if required. Installation of an intermediate well will be evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field. The proposed well nest at Location B6 may be eliminated.
- A water table well at Location C2.
- Monitoring well nests at Locations D3 and D4, to consist of a water table well, a deep well, and an intermediate well, if required. Installation of an intermediate well will be evaluated based on the decision flowchart in Additional Comment #2 and location-specific information collected in the field.

## Comments from 8/11/04

### **General comments**

#### Soil Sampling and Analysis (vol. 1)

1. The process for evaluating soil background should be systematic and independent of the sampling results. At a minimum, ISG should clarify how background concentrations in soil will be determined and identify what statistical methods, if any, will be used to establish background concentrations from the data set (e.g., sample average, 95% upper confidence limit). ISG should clarify how site data will be compared to background data and should identify what statistical methods will be used to determine whether the site and/or group data set(s) are statistically different from background. The criteria for comparing soil data to soil background concentrations (i.e., similar lithology) should also be discussed. In addition, since groundwater sampling was proposed in the revised work plan, this discussion is also pertinent to groundwater.

Non-parametric, log normal, s.d., 95% UCL, etc; all perimeters found to be acceptable by Bhooma

2. Because slag-fill is prevalent in East Chicago, it may not be feasible to evaluate background in non-slag-fill impacted areas (i.e., naturally occurring background). However, ISG should be aware that the proposed slag-fill background concentrations (both soil and groundwater) may be used as delineation tool only. Slag-fill background concentrations (i.e., anthropogenic background concentrations) may not be used to eliminate chemicals of potential concern (COPCs) for evaluating human health and ecological risk (proposed Tier 1 or Tier 2 risk screening).

Background for former coke plant area proposed in northwest area adjacent to fcp area. Background will be analyzed separately for land-side and water-side. Water side consists of two samples, land side will consist of one in location negotiated today.

3. The Work Plans (revised work plans) specifies the completion of eight soil borings to characterize fill in un-impacted areas of the facility. The samples will be collected at 0 - 2 feet, 4 - 6 feet, and potentially 10 - 12 feet below ground surface (bgs) if groundwater occurs below 12 feet bgs.

The 0 - 2 feet and 4 - 6 feet samples are appropriate and should be retained in the work plans. However, the 10 - 12 feet sample specification should be revised because it appears that groundwater on site does not typically exceed 12 feet bgs. To gain more detailed information about vertical changes in soil quality as the water table is approached, ISG should specify laboratory analysis of samples collected at 0 - 2 feet bgs, 4 - 6 feet bgs and the 2-foot interval above the water table if groundwater occurs at depths equal to or greater than 10 feet bgs.

In addition to the slag borings, these soil sampling requirements also should be applied to the majority of the SWMU and non-SWMU related soil/fill borings and monitoring wells where the work plans specify sampling at 0 - 2 feet, 4 - 6 feet, and potentially 10 - 12 feet. Exceptions include units where no subsurface soil sampling is required (i.e., Unit No. 7) and where hand augering is specified due to lack of drill rig access (i.e., Unit No. 9). ISG should address these soil sampling requirements.

Backfilled pits (i.e., Unit Nos. 10, 26, and 73) are also an exception. These pits require an alternative sampling strategy to intercept potential maximum contaminant concentrations. The sampling methodology for soil should be revised to collect a surface sample from 0 - 2 feet and one subsurface samples at the base of the pit, and one subsurface sample at 2 - 4 feet below the base of the pit.

In addition, provisions for additional sampling should be incorporated into the sampling selection procedure based on field observations such as visual indications of soil impacts, detection of odors, or indications of contamination from photoionization detector or flame ionization detector (PID/FID) field screening procedures. Please note that the Standard Operating Procedures contained in Appendix A of the Quality Assurance Project Plan (QAPP) Volume 5 of 5 (Revision 1) do not include a procedure for field screening of soil cores using organic vapor detection equipment. ISG should provide this SOP.

Note that the methodology to sample saturated soils adjacent to screened intervals in deep piezometers, as specified in the revised work plans, is adequate.

8-10' to GW: 2 samples proposed, one in the saturated vadose zone and one to characterize potential leachate, this is agreed upon. Backfilled Pits: may be no evidence of former base & currently below water table already: propose 0-2' sample & if base is BWT, sampling will follow the plan, this is agreed upon.

4. ISG proposes applying a 10 x 10 feet grid over the area of the unit and adjacent areas and then selecting sampling points through the use of a random number generator. However, inclusion of adjacent areas in the grid has in some cases resulted in a disproportionate number of sample locations in areas outside of the principal areas of interest. Specifically, only one of six borings specified for Unit No. 10 (Terminal Lagoon Sludge Pits), one of three borings specified for Unit No. 23 (Filter Backwash Pile), and three of six borings specified for Unit 26 (Old Sludge Pit) are located within the unit boundaries where potential waste materials were routinely deposited (i.e., within pit or pile boundaries).

To avoid a disproportionate number of samples collected at Unit Nos. 10, 23, and 26 in areas outside of the principal areas of concern, the work plans should be revised to perform random grid sampling only over those areas where potential waste materials were routinely deposited. To do so, the grid should be overlain within the unit

boundaries where material deposition occurred and the number of samples required should be recalculated based on the revised number of grid nodes.

Soil borings located in adjacent areas will also be required, but should be located through directed sampling based on knowledge of SWMU activities and visual indications of surface impacts. Two directed surface/subsurface soil borings at each unit are required for Unit Nos. 10, 23, and 26.

Grid: ISG will redefine boundaries of grids in addition to visual inspections, this is agreed upon

## **SPECIFIC COMMENTS**

### **Soil Sampling and Analysis Plan (Volume 1)**

#### **Volume 1, Section 1.2.1, Conceptual Site Model, Page 3-4**

5. The conceptual site models currently neglect relevant contact media and potential receptors. A list of additional potentially complete exposure pathways is presented in Table 1 below. ISG should consider these contact media and potential receptors and revise the conceptual site models accordingly. Alternatively, if ISG feels that these are not pertinent to the site, ISG should provide a detailed discussion on why these are not considered viable pathways to include in the conceptual site models.

**Table 1 - List of Additional Potentially Complete Human Health Exposure Pathways**

Contact Medium	Receptor	Issue
Groundwater	Future Site Worker	Potential for future dermal contact with shallow groundwater (e.g., construction workers scenario) or groundwater used for process water is not discussed.
Air (indoor and outdoor)	Current/Future Site Worker	Current/future potential for volatile emissions migrating from contaminated soil or groundwater to indoor and outdoor air is not discussed. In addition, current/future potential for inhalation exposure to contaminated soil particulates in outdoor air is not discussed.
Lake Michigan (surface water)	Recreator	Current/future potential for recreational use of Lake Michigan is not discussed.
Sediment	Future Site Worker	Future potential for dredging lagoons or industrial redevelopment of units is not discussed.
Surface Slag-Fill (Group D)	Current Site Worker	Rationale for excluding current site worker exposure is not discussed.

Potential pathways were not in original CSM. Need to be considered upon looking at data. Where applicable, it will be revised, this is agreed upon.

#### **Volume 1 Section 5.1, Group A, Units nos. 1, 67 & 68**

6. The location and number of soil borings required for Unit No. 67 and 68 were determined in the work plan by applying a single grid over the area occupied by both units. A more representative approach to successfully characterize soil conditions would be to treat the units separately and develop separate grids and sampling plans for each unit (10' X 10' grid system). Alternatively, for Units 67 & 68, the following boring locations should be moved. Using the provided map scale in Figure 5-1B, boring location SB-132 should be moved approximately 100' directly south of boring SB-133

and boring SB-132 should be moved approximately 50' directly east for better coverage. Also the revised work plan adequately addresses the need for the two additional surface soil borings to the west of the filter cake pile. However, the revised work plan does not include the surface/subsurface soil boring that was specified in the original work plan and required by the EPA comments. ISG should indicate that an additional soil boring will be collected to characterize surface and subsurface soil conditions adjacent to the concrete storage pad.

Borings will be moved, original boring was not moved but renumbered, this is agreed upon

**Volume 1, Section 5.3.2, Unit No. 9, Page 5**

7. ISG indicates that surface samples will be collected from 0 - 2 feet bgs from four hand auger borings. However, subsurface samples are also required at these locations to assess the potential for vertical migration of contamination. ISG should indicate that they will collect subsurface samples at the 4 - 6 feet bgs interval, or to refusal with the hand auger.

In addition, the proposed sample locations were selected randomly from a 10 ft x 10 ft grid. However, review of the proposed locations suggest that two randomly located borings coupled with two directed sampling points would be more appropriate to characterize potential contaminant concentrations in soil in this area. ISG should include two directed sample locations: one upgradient and one downgradient boring at locations immediately adjacent to the tank platform.

Additionally, ISG should clarify the location of the former tank and tank platform. It is unclear where it is located.

Refusal with hand auger agreed upon. One up gradient and one down gradient sample will be taken.

**Section 5.4 Group D, Unit No 7 (The Hill)**

8. ISG suggests that 16 surface samples will be collected at random locations. Fig 5.3C however depicts a biased sampling approach focusing mainly on the south eastern end of the hill with not much emphasis on north western end. ISG should provide a rationale for choosing these sample locations in the context of statistical evaluation and the end use of the data in analyzing potential slag fill impacts with respect to surface run off, human exposure pathways and ecological concerns.

The Hill will be divided into four quadrants with random sampling on each, this is agreed upon.

**Volume 1 Section 5.7 Group G, Unit no. 47 (Central Waste Treatment Plant)**

9. We suggest adding two additional borings for better coverage of this unit. One boring should be located in the central portion and the other should be located toward the western edge of the unit.

Like the hill, four quadrants will be made and sampled from the center, this is agreed upon.

#### **Volume 1 Section 5.8 (Former Coke Plant)**

10. Although 5 surface and subsurface samples are proposed for this area, the soil sampling strategy did not include the collection of surface samples from the area west of the former coke area as requested by U.S. EPA. ISG should revise the soil sampling plan to include the collection of soil samples from the vegetative area between location **B5** and **B4** west of the former coke plant

Comment was agreed upon as is

#### **Sediment Sampling and Analysis (Vol. 2)**

##### **Volume 2 Section 4.1.4 Defining the Boundary Study**

11. We believe ISG has erroneously interpreted the U.S. EPA's April 2004 letter to mean that the ISG could only collect sediment samples from the two onsite Lagoons. The April 2004 letter was a modification of U.S. EPA's March 2004 comments eliminating the need for the collection of surface water and sediments from Lake Michigan. The letter does not eliminate the need to collect sediment samples from the onsite intake flume and sediments in close proximity to the former coke plant area. Regardless of whether the intake flume is listed separately in the 3013 Order, the intake flume is a water body associated with the Clark Landfill, one of the SWMU listed in the 3031 Order. Collection and analysis of sediment samples adjacent to and in close proximity to the former coke plant area could be used to conclusively demonstrate that contaminants are not migrating from the area. Revise the Wordplay to provide for the collection of sediment samples from the intake flume and from the shoreline along the former coke plant boundary area.

Lake Mich sed samples: none, agreed upon. Sed samples next to Coke Plant area: if after initial data gathering there's a need to examine migration pathways and additional sampling is needed, ISG will do so, this proposal was agreed upon IN WRITING. Intake Flume: no longer any sed. left from the 1990's dredging project, therefore, no samples will be taken, this is agreed upon.

##### **Volume 2, Section 5.1 Unit No. 8 (Terminal Lagoon)**

12. The proposed sampling for the North and the Terminal Lagoons is acceptable. However, the proposal to collect subsurface slag at the 2- 4 feet interval is not acceptable. Slag samples should be collected at the 0 - 2' and 2 - 4' depth intervals.



ISG will sample from 0-2' with perimeter wells, this is agreed upon.

### **Hydrogeological Conditions and Groundwater Sampling Wordplay**

13. The array of monitoring wells and piezometers proposed by ISG are still inadequate to enable us understand the potentially complex flow at the facility. ISG have also failed to include in their proposal of an initial monitoring network any proposal to install intermediate wells as recommended by the U. S. EPA. Information regarding water quality and groundwater head distribution at intermediate depths are necessary during the initial phase of investigation to build a conceptual understanding of groundwater conditions at the site. With regards to piezometers at this site, not only are their utility severely limited in terms of obtaining groundwater quality data, they are also not sanctioned by U.S. EPA as RCRA groundwater monitoring wells. In consideration of what has been proposed in the revised wordplay by ISG, our recommendations for groundwater monitoring well location adjustments and conversion of some piezometers to groundwater monitoring wells are as follows: Refer to U.S. EPA Figure C-1 attachment to the march 16, 2004 letter and the ISG Figure 4-1.
- a) **Location A.** At locations **A7, A9, A13 and A14**, nested groundwater monitoring wells must be completed as requested by U.S. EPA in order to obtain perimeter information on groundwater quality and hydrologic gradient data. Convert all proposed piezometers at other **A** locations to groundwater monitoring wells and install all intermediate groundwater monitoring wells across the fill/Calumet sand contact where drilling indicates that the fill and Calumet sand are sufficiently thick to allow for installation of both the water table and intermediate wells, without overlapping of the screened intervals.
- b) **Location B.** Retain the water table well, the deep well at the **B6** location and install an intermediate if needed. All other **B** locations are acceptable, however, all proposed piezometers must be converted to groundwater monitoring wells.
- c) **Location C.** Install a deep groundwater monitoring well at Location **C1** and an intermediate groundwater monitoring well if needed. Install a water table well at location **C2**.
- d) **Location D.** Install nested groundwater monitoring wells at locations **D3 and D4** as requested by U.S. EPA in order to obtain groundwater quality and groundwater gradient information and groundwater flow directions and on-coming groundwater quality in addition to potential pathway information for Markstown. The proposed water table wells are acceptable at location **D** are acceptable.

USEPA will discuss and get back to ISG

13. To a large extent, the project area potentially contains various thicknesses of slag-fill. However, based on the proposal to install deep piezometers and to collect slag samples from areas claimed to be un-impacted by the facility operations, we recommend that

B

groundwater samples be collected from these two areas as a preliminary step of establishing background at the facility. Figure 4-1 identifies these two locations as 901P and 902P. As indicated above these piezometers should be converted to ground water monitoring wells. Target horizons should be the mid-point of the Calumet Sands and be constructed with 3 foot well screens. Please ensure that vertical gradient information is determined prior to sampling such that strongly downward gradients would adversely influence a background location. Both filtered and unfiltered groundwater samples should be collected from the midway point within the screens at these locations using appropriate U.S. EPA ground-water quality collection methods. Data obtained should be analyzed within a statistically robust work plan that addresses both temporal and spatial representativeness.

Will need to be revisited

**Volume 1, Section 5.6.1, Unit No. 23, Page 8**

14. According to Figure 3-17 in Volumes 1 through 4, groundwater flow direction in the vicinity of Unit No. 23 is towards the north and North Lagoon. In the revised work plans, the proposed location for the monitoring well at Unit No. 23 is to the east. ISG should locate the well adjacent to and north of the unit to intercept downgradient flow paths.

OK

**Volume 1, Section 5.2, Unit No. 20, Page 3**

16. ISG indicates that well MW-203 will penetrate the failed area. To evaluate the position of well MW-203 in relation to the landfill failure area, Figure 5-2 should be revised to depict the approximate failure boundaries.

OK

**Volume 3, Section 5.3, Group - C, Units No. 8, No. 9, and No. 10, Page 3**

17. The revised work plans specify that three water table groundwater monitoring wells and one deep piezometer (bottom of Calumet sand) will be installed at Group C Units. On Page 3, the work plan states that "the piezometer will be adjacent to the upgradient water table well to provide coverage more inland on the peninsula." However, the deep piezometer wells are designed to detect potential dense non-aqueous phase liquid (DNAPL) that may have migrated to and ponded on the top of the clay till unit. Because the clay unit in this area apparently slopes to the east in this area (according to Figure 3-9), the deep piezometer would be more effective at detecting DNAPL if located along the eastern side of Group C units. ISG should relocate the deep piezometer adjacent to proposed water table well MW-302 (illustrated in Figure 5-3A).

OK

**Volume 3, Section 5.6, Group - F, Units No. 23, No. 24 and No. 26, Page 4**

18. The revised work plan states the fill between the North Lagoon Area and the property boundary was grouted to prevent seepage from the lagoon and that "the grouting was likely to affect local groundwater flow and quality." To provide a better understanding of how the grouting may influence groundwater, provide additional detail regarding the grouting project and indicate on Figure 5-5A the boundaries of the grouted fill area.

OK

**Volume 3, Section 6.1, Monitoring Well Installation, Page 1**

19. The work plan specifies that "the monitoring wells will be developed after the well is installed by surging and purging the well until the development water clears." A more rigorous methodology for well development is required. Provide additional information that specifies stabilization of field parameters and minimum number of well volumes to be removed in the event that development water remains turbid or field parameters fail to stabilize.

OK

**Volume 3, Section 6.3.3, Hydraulic Conductivity Testing, Page 3**

20. The revised work plan specifies the completion of slug tests at one water table monitoring well per group. No slug tests are specified for the deep piezometers or the non-SWMU monitoring wells. Due to the general lack of aquifer parameter data at the facility and the importance of gaining a better understanding of aquifer characteristics, ISG should include slug testing of one water table monitoring well per unit, as well as all (SWMU and non-SWMU) deep piezometers and all non-SWMU water table monitoring wells.

OK

**Volume 4, Section 1.2.1.1, Human Health and Ecological Risk Assessment Planning Steps, Page 4**

21. Since there is no site-specific groundwater data (hydrogeological or chemical), it is presently inappropriate to consider human health exposure incomplete. Current/future on-site workers may potentially be exposed to VOC emissions in indoor or outdoor air from shallow groundwater. In addition, since no groundwater use restrictions are in place, future human receptors (e.g., future site workers) may potentially be exposed to contaminated groundwater (e.g., dermal contact with industrial process water). It is

recommended that ISG consider future human health receptor exposure to groundwater and include it in the Tier 1/Tier 2 risk screening process.

**Volume 4, Section 4.1.3, Identifying Inputs to Decision, Page 2**

22. Section 4.1.3 indicates that groundwater data will be evaluated on a per-sample or per-group basis by comparing to the project-specific DQOs, which include IDEM criteria (solubility, maximum contaminant levels [MCLs], industrial levels, and default closure levels) and EPA ESLs. It is unclear how this process differs from Tier 1 screening or how comparing the data will meet project-specific DQOs. Therefore, it recommended that ISG provide additional details or reference the applicable sections in the QAPP regarding selection of DQOs, the specific process for comparing data to DQOs, and the consequences if DQOs are not met.

**Volume 4, Section 4.4.4, Defining the Boundaries of the Study, Page 3**

23. On Page 3, it is stated that if analytes are detected above DQOs in the initial sampling round, subsequent sampling events will be conducted following EPA approval only for the compounds detected above DQOs and only at locations where groundwater impacts were detected. However, the decision to alter the lists of analytes and areas that require sampling cannot be based on one round of sampling. Confirmatory rounds of sampling should be conducted quarterly for one year to account for seasonal variations in water quality. Once these data are evaluated, a reduced analyte list may be considered, following coordination with and approval by EPA.

**Volume 4, Section 6.2, Groundwater Sample Procedures, Page 1**

24. On Page 1, it states that "wells will be purged with a bailer or by low-flow purging techniques" and in the next sentence "purging will be performed using a low-flow peristaltic pump." On Page 2, it is stated that "groundwater samples will be collected using the purging equipment (disposable polyethylene bailer or low-flow peristaltic pump)." VOCs are a potential contaminant of concern (PCOC); therefore, to ensure more representative VOC sampling results, low-flow peristaltic pumps should be specified to purge and sample the groundwater monitoring wells.

OK

**Volume 4, Section 6.2.1, Groundwater Levels, Page 2**

25. The revised work plan specifies that groundwater level in the monitoring wells will be measured prior to groundwater purging and sampling. However, the Administrative Order states in Section 52C that the determination of seasonal variations in groundwater flow direction and velocity is required. To assess seasonal water level fluctuations, ISG

should specify quarterly measurement of all SWMU and non-SWMU groundwater monitoring wells (water table and deep).

OK

## **Human Health and Ecological Risk Assessment Planning Steps (vols. 1 & 2)**

### **General Comments**

26. Although the proposal to use the Region Six CAS has been withdrawn, some terms and methods from the CAS may continue to be proposed in the Work Plans. For example, in Section 1.2.1.1.2 *Ecological Risk Screening Assessment* the Tier 1 and Tier 2 approach for ecological risk assessment does not have a referenced methodology. Region Five requires that ecological risk analysis for Corrective Action follow the *Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, EPA, 1997, (ERAGs) and the *EPA Guidance for Ecological Risk Assessment*, 1999. For ecological risk assessment, the screening phase (ERAGS steps one and two) is termed the Screening Level Ecological Risk Assessment (SLERA) (potentially equivalent to the Work Plan term "Tier 1"). The subsequent phase is termed the Baseline Ecological Risk Assessment (BERA). The Work Plan term "Tier 2" does not appear to be equivalent to the remaining steps of ERAGs. Subsequent documents should use the appropriate ERAGs terminology and methodology.

The Human Health and Ecological Risk Assessment Planning Steps sections of the revised work plans do not provide sufficient detail to assess whether the risk screening procedures are adequate. For Tier 1 risk screening, ISG should present a very detailed and specific discussion including, but not limited to, EPC calculations, potential human health and ecological receptors, risk screening levels, cumulative risk considerations, selection of COPCs, and criteria for conducting Tier 2 risk screening or site-specific risk assessment. For Tier 2 risk screening or site-specific risk assessment, ISG has not provided adequate detail to ensure that the proposed approach is consistent with IDEM RISC and EPA risk assessment guidance. It is recommended that ISG provide additional specific details on the sampling and analyses, or alternatively, submit a separate human health risk assessment work plan that discusses the necessary Tier 1 and Tier 2 detailed information.

With respect to the ecological risk assessment, it is recommended that ISG provide specific details on the screening approach to demonstrate that ERAGs steps one and two are being followed. The "Tier 2" approach as described for human health/ecological risk assessment does not appear to correspond to the remaining BERA steps. Alternatively, as suggested for the human health risk assessment, ISG could submit a separate ecological risk assessment work plan to provide the necessary Tier 1 and Tier 2 detailed information.

27. Developing conceptual site model diagrams and including an accurate portrayal of all potential current and future human health and ecological receptors is vital for designing a sampling and analysis plan without resulting in significant data gaps. It is **strongly** recommended that ISG have their conceptual site model diagrams reflect preliminary risk assessment conceptual models. This will ensure that sufficient data are collected during this phase of investigation to conduct Tier 1/Tier 2 risk screening or a site-specific risk assessment. If ISG elects not to revise the conceptual site model diagrams to consider all potentially complete exposure pathways for human health and ecological receptors, it is more likely that additional phases of investigation will be required to collect the necessary data. For example, contaminated groundwater may discharge to surface water (e.g., Lake Michigan) that may be used for recreational activities. Thus, clear understanding of the site-specific hydrogeological conditions and the extent of groundwater contamination is essential to assess current and future risks to recreators. The conceptual site models should be revised to reflect consideration of all likely current and future receptors.

### **Specific Comments**

#### **Volume 1, Section 1.2.1.1, Human Health and Ecological Risk Assessment Planning Steps, Page 4**

28. ISG should discuss comparing reporting limits to human health and ecological screening criteria in this section of the work plan. It is noted that method detection limits and/or practical quantitation limits exceed the Ecological Screening Levels for a number of constituents. ISG should clarify how this issue will be addressed. This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.
29. In the response to EPA comments, ISG indicates that an alternative proposal for presentation of data is provided in the revised work plan, but the revised work plan includes no such proposal. ISG should provide information on how non-detected analytes, biological nutrient elements, and analytes lacking toxicity values will be evaluated in the Tier 1 risk screening. It is important that these data be retained in summary tables presented in the Risk Evaluation Report. In particular, it is inappropriate to remove a chemical lacking toxicity values from summary tables because doing so would, in effect, remove that chemical from consideration as a constituent of potential concern (COPC). Eliminating a chemical as a COPC because toxicity values are not available is not appropriate for human health or ecological risk screening. Additionally, non-detected chemicals must be retained and presented in summary tables, including their range of detection limits and applicable screening values. This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.
30. ISG should clarify field duplicate data will be utilized in the risk screening (i.e., the maximum detected concentration, provided both concentrations are qualified as usable).

This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.

**Volume 1, Section 1.2.1.1.1, Human Health Screening Risk Assessment Procedures, Page 5**

31. Because the IDEM RISC Industrial Soil Closure Levels are based on 1E-05 risk levels, group-specific hazard indices (HIs) below one (1) do not necessarily indicate that *de minimis* human risk is present at the site; rather, it does indicate that group-specific HI are within an acceptable risk range of 1E-04 to 1E-06. Also, ISG has not discussed cumulative risk across for human health receptors potentially exposed to contamination from multiple groups. ISG should provide a discussion on how they will address cumulative risk.
32. Although ISG indicates that the Tier 2 screening process has been eliminated in the revised work plan, Tier 2 risk screening and the development of critical values (CV) is discussed on page 5 of Section 1.2.1.1.1. The proposed Tier 1 and Tier 2 risk evaluation is not explicitly clear in the work plan such that it is difficult to determine whether the proposed approach is consistent with Indiana Department of Environmental Management's (IDEM's) Risk Integrated System of Closure (RISC) guidance. It is recommended that ISG clarify the proposed approach for evaluating contaminant concentrations at the site with respect to assessing risks to human health. Specifically,
  - The revised work plan indicates that each analyte's exposure point concentration (EPC) will be compared with the IDEM's direct closure criteria, but provides no detail on the actual calculation of the EPC. ISG should indicate how EPC's will be calculated. Section 6 of the RISC Technical Guidance provides explicit instructions for calculating potential exposure concentration (EPCs) that are representative of concentrations at the site and should be compared to default closure levels.
  - The revised work plan continues on to state that a Tier 1 screening Hazard quotient (HQ) will be developed as a result of comparing the EPC to the IDEM default closure value. ISG should clarify that the intent of calculating an HQ and the summation of HQs is to address cumulative risks due to multiple contaminants, and this is performed for both carcinogens and noncarcinogens. The evaluation of cumulative risks should be explained in greater detail.
  - Additionally, the work plan indicates that the results of this screening will be used to determine preliminary remediation goals for soil to protect human health and/or focus the area-specific risk assessment. ISG should clarify how these results will result in determining remediation goals.
  - It should be noted that the RISC Default Closure Tables, as provided in Appendix 1 of the RISC Technical Guidance, have been recently updated, and starting July 1, 2004, the new values will be in effect.

- The discussion regarding the Tier 2 process should provide the proposed exposure assumption parameter values for the development of Tier 2 screening criteria and CV. ISG should specify whether site-specific equation parameters will be utilized, and if so, include the proposed values. ISG should also specify how group specific data or EPCs will be calculated to compare to group-specific CVs.

It is recommended that ISG either incorporate this information into their response, or alternatively, prepare a separate Tier 1 and Tier 2 risk screening work plan. Note that this comment also applies to Section 1.2.1.1.1 (Human Health Risk Assessment Procedures) in Volume 2 and 4.

**Volume 1, Section 1.2.1.1.2 Ecological Risk Screening Assessment, Page 6**

33. ISG should indicate which guidance documents will be used to prepare the ecological risk assessment. The statement that the process for ecological risk assessment is identical to the human health (HH) screening procedure should be reconsidered based on the ERAGs. The idea to possibly "use the [ESL] ecological criteria as preliminary remediation goals" is ill-advised. The ESLs are not criteria, as the document states, but highly conservative screening thresholds. If the facility plans to identify early in the assessment process the areas where levels of contamination likely pose unacceptable risks to ecological receptors, for the purpose of identifying a course of remediation, this should be made clear and discussed further.
34. ISG notes that Region 6 CAS worksheets will be completed as part of the ecological site reconnaissance ; this approach is acceptable. Ideally, this step would have preceded the development of the sampling plan. ISG should understand that the ecological site conceptual models submitted as part of the Risk Evaluation Report will be reviewed and evaluated in accordance with EPA Region 5 policy and the checklist may identify additional areas for risk evaluation and further sampling. This comment also applies to Section 1.2.1.1.2 (Ecological Risk Screening Assessment) in Volume 2 and 4. Copies of correspondence with the natural resource agencies must be included in the risk assessment.
35. In the response to EPA comments, ISG indicates that the suggested ecological risk assessment sources would be considered for chemicals lacking Region 5 Ecological Screening Levels (ESLs). Based on a review of Section 1.2.1.1.2 and Table 4-1, however, it appears that the suggested sources were not reviewed. ISG should specify which sources of screening values were reviewed, and screening values from sources other than Region 5 ESLs should be footnoted in Table 4-1. Please note that the National SSLs, which have been developed for nine metals, take precedent over the ESLs and therefore need to be used in the SLERA. This comment also applies to Section 1.2.1.1.2 (Ecological Risk Screening Assessment) in Volume 2 and 4.



36. It is noted that additional evaluation of bioaccumulative chemicals in the Tier 1 risk screening needs to be included only in areas where sensitive environments (defined in EPA 1997) occur. In the "benchmark operational area-specific risk assessment," dietary exposure to appropriate wildlife receptors should be evaluated for all potentially bioaccumulative chemicals. The Risk Evaluation Report should clearly outline all calculation methods, exposure parameters, and toxicity values that will be used to evaluate risks to wildlife. Further revision of the work plan to address this issue is not necessary at this time, but the Risk Evaluation Report should address this issue according to the above recommendations.

#### **Volume 1, Table 1-1, Investigation Decision Flow Chart**

37. The investigation decision flow chart indicates that anthropogenic background concentrations are going to be compared to the data to identify chemical of concern (COCs) for a site-specific risk assessment. Eliminating COPCs or COCs using anthropogenic background is not appropriate.
38. The investigation decision flow chart implies that unless all the concentrations exceed established human health or ecological risk screening criteria, no further action (NFA) is necessary. The decision flow chart should be revised to indicate that only if all concentrations fall below established human health or ecological screening criteria is NFA is necessary.
39. The investigation decision flow chart does not appear to present the Tier 2 risk screening step. The investigation decision flow chart should be revised to include how the Tier 2 risk screening process will be incorporated into the investigation.

#### **Quality Assurance Project Plan**

##### **GENERAL COMMENTS**

40. In response to the EPA request for documentation of previous analytical data, ISG states that historical data could not be substantiated to the degree required by the Region 5 QAPP instructions. Therefore, historical data was not used to select sampling locations and was not included in the revised work plans. ISG should provide tabular summaries of all available analytical data, along with a detailed explanation of how the data fail to meet the specifications of the Region 5 QAPP instructions. The Boring Location Map, which appears as Figure 3-5 in Volumes 1 through 4, should be reviewed to ensure that boring locations with analytical results are illustrated.
41. The following inconsistencies were noted in the tables associated with the QAPP and require clarification:

Table 1-3 identifies the analyte list for groundwater analyses. Revise the table to provide the analytical method reference number as well as the

acceptance criteria to be used for the following parameters: boron, sodium, ammonia, total organic carbon (TOC), and chloride.

- Table 1-4 indicates that for sulfide analysis, SW-846 Method 9030 will be used. Clarify why SW-846 Method 9030B has not been referenced.
  - The text of the QAPP as well as Table 4-1 indicate that EnCore samples for volatile organic compounds (VOCs) will be extracted by SW-846 Method 5035; however, none of the tables provide a reference to this method. Clarify and ensure that the QAPP and the associated tables are comprehensive and consistently identify all methods to be used for the sampling events.
  - None of the tables provided includes the preparation method(s) to be used for the inorganic methods. Clarify and provide this information for each parameter to be analyzed.
  - Table 4-1 which provide the sample container, preservation and holding time information identifies the analytical method for polycyclic aromatic hydrocarbons (PAHs) as "827°C". Revise the table to correctly identify the method as "8270C".
42. As per the *RCRA QAPP Instructions, U.S.EPA Region 5* requirements the QAPP must be include a detailed discussion of how the data will be assessed as to whether the originally defined objectives were satisfied. Ensure that all project data are assessed by capable facility representatives in accordance with the Region 5 Data Quality Assessment (DQA) Policy. For projects involving large numbers of samples, or to evaluate sample matrix interference and its effect on final data, statistical analysis and/or hypothesis testing may be required. Guidance on procedures, methods, rationale and equations for evaluating data of this type is offered in *Guidance for Data Quality Assessment - Practical Methods for Data Analysis* (EPA QA/G-9, July 2000).

#### **Quality Assurance Project Plan (Volume 5)**

##### **Volume 5, Section 1.1.3, The Project Proposal, Proposal Objectives, and Decision Statements, Page 3**

43. As required by the *RCRA QAPP Instructions, U.S.EPA Region 5*, ISG must provide a discussion of the consideration of human health risk-related issues that may impact field activities. Such issues that should be considered may be: land use planning and assumptions, selection of detection limits/reporting limits, risk-based screening options, background sampling, and data quality for assessing human health risk.

##### **Volume 5, Table of Contents, Page 9**

44. In accordance with the *RCRA QAPP Instructions, U.S.EPA Region 5* and *EPA QA/R-5*, immediately following the list of tables and figures in the table of contents, a complete listing of QAPP recipients must be included. Ensure that the personnel that are identified on the Signature Page are included in this Distribution.

**Volume 5, Section 1.4.2.4, Physical Parameters, Page 44**

45. This section of the QAPP indicates that several field parameters will be analyzed for during the project. The last sentence of the paragraph states that "The use of the listed characterization procedures or analyses will be described in the individual work plans, as appropriate." Although it is acceptable to reference other project-related documents for information, it is critical that very specific references to where this information may be found be provided in the QAPP. Revise the QAPP to provide a very clear reference to specific work plans (e.g., page and section number) or provide a tabular summary of the information within the QAPP itself.

**Volume 5, Section 1.4.3, Laboratory Analysis, Page 33**

- 46.. The revised QAPP states that "sulfide, boron, chloride, ammonia and chemical oxygen demand (COD) will be collected for groundwater samples." However, Table 1-3, which lists the parameters to be collected for groundwater, identifies several additional parameters that were not noted in the text, specifically sodium, alkalinity, hardness, and TOC. Additionally, COD is not listed as an analyte of interest in Table 1-3. Finally, Table 1-3 indicates that hexavalent chromium will also be a parameter of interest; however, Section 1.4.2.3 only lists "chromium." Clarify and ensure that the text and associated tables are consistent and clearly identify a comprehensive parameter list for each media to be sampled.

**Volume 5, Section 1.5.1, Rationale of Selected Sampling Locations, Page 35**

47. The revised QAPP states that "the sample locations for the Groups are depicted on Figures 5-1 through 5-7 and the rationale for the sample collections are presented below." This section discusses past sampling results but ISG needs to provide the following information:
- A list of all environmental measurements to be performed for the current sampling event.
  - A tabulated description and itemization of all specific tasks to be performed in the generation of field and laboratory data, linked to every specific objective and decision rule defined for the project
  - A summary table listing, for each sampling location, the total numbers of samples (including investigative, quality control [QC], split and reserve), sample type or matrix, and all measurements to be

performed, differentiate where applicable to critical measurement from the noncritical measurements. Critical measurements are those specifically emphasized in project decision rules. Noncritical measurements are those to be performed in conjunction with the reporting of identified critical measurements.

**Volume 5, Section 14.1, Page 1**

48. This section of the QAPP discusses the contents of the project quality assurance reports. As required by *RCRA QAPP Instructions, U.S. EPA Region 5*, revise the QAPP to ensure that all data validation and assessment results since the last report are included.

**Volume 5, Appendix A**

49. Appendix A contains the Standard Operating Procedures (SOPs) for the field investigation. As noted in the General Comment A from the General Guidance Comments, there is a request to perform field screening for volatile organic compounds of soil cores, using organic vapor detection devices such as a PID or FID. Please include an SOP for headspace analyses of volatile compounds in soil samples collected during the investigation.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION 5**

**77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590**

REPLY TO THE ATTENTION OF:

August 6, 2004

**VIA FACSIMILE AND CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

James Flannery  
ISG Indiana Harbor Inc.  
Tecumseh Redevelopment Inc.  
3001 Dickey Road  
East Chicago, Indiana 46312-1610

Re: In the Matter of ISG Indiana Harbor Inc. and Tecumseh Redevelopment Inc.  
RCRA Docket No.: R3013-5-03-002  
Revised Sampling and Analysis Work Plans

Dear Mr. Flannery:

The United States Environmental Protection Agency (U.S. EPA) has completed the review of the revised May 2004 Work Plans for the ISG Indiana Harbor facility located in East Chicago, Indiana. Our review indicates that the revised work plans addressed many of the issues initially identified in the November 2003 work plans. However, several fundamental issues remain unaddressed in these work plans. We are providing you with a conditional approval contingent on ISG Indiana Harbor providing an addendum to comments that addresses the issues raised in this attachment.

Finally, we are encouraged that ISG has abandoned the Region 6's corrective action approach in favor of the traditional approach called for in the 3013 order. However, the remaining issues identified in the attachment must be addressed prior to approval of these workplans. The addendum addressing these remaining issues should be submitted to U.S. EPA within 30 days of receipt of this letter and attachment.

Please contact me at (312) 886-7954 if you have any questions.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jonathan Adenuga".

Jonathan Adenuga  
Enforcement and Compliance Assurance Branch

ATTACHMENT

Sept 17

219 391-2571

GC4 - 2nd

General comments

Soil Sampling and Analysis (vol. 1)

1. The process for evaluating soil background should be systematic and independent of the sampling results. At a minimum, ISG should clarify how background concentrations in soil will be determined and identify what statistical methods, if any, will be used to establish background concentrations from the data set (e.g., sample average, 95% upper confidence limit). ISG should clarify how site data will be compared to background data and should identify what statistical methods will be used to determine whether the site and/or group data set(s) are statistically different from background. The criteria for comparing soil data to soil background concentrations (i.e., similar lithology) should also be discussed. In addition, since groundwater sampling was proposed in the revised work plan, this discussion is also pertinent to groundwater.
2. Because slag-fill is prevalent in East Chicago, it may not be feasible to evaluate background in non-slag-fill impacted areas (i.e., naturally occurring background). However, ISG should be aware that the proposed slag-fill background concentrations (both soil and groundwater) may be used as delineation tool only. Slag-fill background concentrations (i.e., anthropogenic background concentrations) may not be used to eliminate chemicals of potential concern (COPCs) for evaluating human health and ecological risk (proposed Tier 1 or Tier 2 risk screening).
3. The Work Plans (revised work plans) specifies the completion of eight soil borings to characterize fill in un-impacted areas of the facility. The samples will be collected at 0 - 2 feet, 4 - 6 feet, and potentially 10 - 12 feet below ground surface (bgs) if groundwater occurs below 12 feet bgs.

The 0 - 2 feet and 4 - 6 feet samples are appropriate and should be retained in the work plans. However, the 10 - 12 feet sample specification should be revised because it appears that groundwater on site does not typically exceed 12 feet bgs. To gain more detailed information about vertical changes in soil quality as the water table is approached, ISG should specify laboratory analysis of samples collected at 0 - 2 feet bgs, 4 - 6 feet bgs and the 2-foot interval above the water table if groundwater occurs at depths equal to or greater than 10 feet bgs.

In addition to the slag borings, these soil sampling requirements also should be applied to the majority of the SWMU and non-SWMU related soil/fill borings and monitoring wells where the work plans specify sampling at 0 - 2 feet, 4 - 6 feet, and potentially 10 - 12 feet.

Exceptions include units where no subsurface soil sampling is required (i.e., Unit No. 7) and where hand augering is specified due to lack of drill rig access (i.e., Unit No. 9). ISG should address these soil sampling requirements.

Backfilled pits (i.e., Unit Nos. 10, 26, and 73) are also an exception. These pits require an alternative sampling strategy to intercept potential maximum contaminant concentrations. The sampling methodology for soil should be revised to collect a surface sample from 0 - 2 feet and one subsurface samples at the base of the pit, and one subsurface sample at 2 - 4 feet below the base of the pit.

In addition, provisions for additional sampling should be incorporated into the sampling selection procedure based on field observations such as visual indications of soil impacts, detection of odors, or indications of contamination from photoionization detector or flame ionization detector (PID/FID) field screening procedures. Please note that the Standard Operating Procedures contained in Appendix A of the Quality Assurance Project Plan (QAPP) Volume 5 of 5 (Revision 1) do not include a procedure for field screening of soil cores using organic vapor detection equipment. ISG should provide this SOP.

Note that the methodology to sample saturated soils adjacent to screened intervals in deep piezometers, as specified in the revised work plans, is adequate.

4. ISG proposes applying a 10 x 10 feet grid over the area of the unit and adjacent areas and then selecting sampling points through the use of a random number generator. However, inclusion of adjacent areas in the grid has in some cases resulted in a disproportionate number of sample locations in areas outside of the principal areas of interest. Specifically, only one of six borings specified for Unit No. 10 (Terminal Lagoon Sludge Pits), one of three borings specified for Unit No. 23 (Filter Backwash Pile), and three of six borings specified for Unit 26 (Old Sludge Pit) are located within the unit boundaries where potential waste materials were routinely deposited (i.e., within pit or pile boundaries).

To avoid a disproportionate number of samples collected at Unit Nos. 10, 23, and 26 in areas outside of the principal areas of concern, the work plans should be revised to perform random grid sampling only over those areas where potential waste materials were routinely deposited. To do so, the grid should be overlain within the unit boundaries where material deposition occurred and the number of samples required should be recalculated based on the revised number of grid nodes.

Soil borings located in adjacent areas will also be required, but should be located through directed sampling based on knowledge of SWMU activities and visual indications of surface impacts. Two directed surface/subsurface soil borings at each unit are required for Unit Nos. 10, 23, and 26.



## **SPECIFIC COMMENTS**

### **Soil Sampling and Analysis Plan (Volume 1)**

#### **Volume 1, Section 1.2.1, Conceptual Site Model, Page 3-4**

5. The conceptual site models currently neglect relevant contact media and potential receptors. A list of additional potentially complete exposure pathways is presented in Table 1 below. ISG should consider these contact media and potential receptors and revise the conceptual site models accordingly. Alternatively, if ISG feels that these are not pertinent to the site, ISG should provide a detailed discussion on why these are not considered viable pathways to include in the conceptual site models.

**Table 1 - List of Additional Potentially Complete Human Health Exposure Pathways**

<b>Contact Medium</b>	<b>Receptors</b>	<b>Issue</b>
Groundwater	Future Site Worker	Potential for future dermal contact with shallow groundwater (e.g., construction workers scenario) or groundwater used for process water is not discussed.
Air (indoor and outdoor)	Current/Future Site Worker	Current/future potential for volatile emissions migrating from contaminated soil or groundwater to indoor and outdoor air is not discussed. In addition, current/future potential for inhalation exposure to contaminated soil particulates in outdoor air is not discussed.
Lake Michigan (surface water)	Recreator	Current/future potential for recreational use of Lake Michigan is not discussed.
Sediment	Future Site Worker	Future potential for dredging lagoons or industrial redevelopment of units is not discussed.
Surface Slag-Fill (Group D)	Current Site Worker	Rationale for excluding current site worker exposure is not discussed.

#### **Volume 1 Section 5.1, Group A, Units nos. 1, 67 & 68**

6. The location and number of soil borings required for Unit No. 67 and 68 were determined in the work plan by applying a single grid over the area occupied by both units. A more representative approach to successfully characterize soil conditions would be to treat the units separately and develop separate grids and sampling plans for each unit (10' X 10' grid system). Alternatively, for Units 67 & 68, the following boring locations should be moved. Using the provided map scale in Figure 5-1B, boring location SB-132 should be moved approximately 100' directly south of boring SB-133 and boring SB-132 should be moved approximately 50' directly east for better coverage.

Also the revised work plan adequately addresses the need for the two additional surface soil borings to the west of the filter cake pile. However, the revised work plan does not include the surface/subsurface soil boring that was specified in the original work plan and required by the EPA comments. ISG should indicate that an additional soil boring will be collected to characterize surface and subsurface soil conditions adjacent to the concrete storage pad.

**Volume 1, Section 5.3.2, Unit No. 9, Page 5**

7. ISG indicates that surface samples will be collected from 0 - 2 feet bgs from four hand auger borings. However, subsurface samples are also required at these locations to assess the potential for vertical migration of contamination. ISG should indicate that they will collect subsurface samples at the 4 - 6 feet bgs interval, or to refusal with the hand auger.

In addition, the proposed sample locations were selected randomly from a 10 ft x 10 ft grid. However, review of the proposed locations suggest that two randomly located borings coupled with two directed sampling points would be more appropriate to characterize potential contaminant concentrations in soil in this area. ISG should include two directed sample locations: one upgradient and one downgradient boring at locations immediately adjacent to the tank platform.

Additionally, ISG should clarify the location of the former tank and tank platform. It is unclear where it is located.

**Section 5.4 Group D, Unit No 7 (The Hill)**

8. ISG suggests that 16 surface samples will be collected at random locations. Fig 5.3C however depicts a biased sampling approach focusing mainly on the south eastern end of the hill with not much emphasis on north western end. ISG should provide a rationale for choosing these sample locations in the context of statistical evaluation and the end use of the data in analyzing potential slag fill impacts with respect to surface run off, human exposure pathways and ecological concerns.

**Volume 1 Section 5.7 Group G, Unit no. 47 (Central Waste Treatment Plant)**

9. We suggest adding two additional borings for better coverage of this unit. One boring should be located in the central portion and the other should be located toward the western edge of the unit.

**Volume 1 Section 5.8 (Former Coke Plant)**

10. Although 5 surface and subsurface samples are proposed for this area, the soil sampling

strategy did not include the collection of surface samples from the area west of the former coke area as requested by U.S. EPA. ISG should revise the soil sampling plan to include the collection of soil samples from the vegetative area between location **B5** and **B4** west of the former coke plant

## **Sediment Sampling and Analysis (Vol. 2)**

### **Volume 2 Section 4.1.4 Defining the Boundary Study**

11. We believe ISG has erroneously interpreted the U.S. EPA's April 2004 letter to mean that the ISG could only collect sediment samples from the two onsite Lagoons. The April 2004 letter was a modification of U.S. EPA's March 2004 comments eliminating the need for the collection of surface water and sediments from Lake Michigan. The letter does not eliminate the need to collect sediment samples from the onsite intake flume and sediments in close proximity to the former coke plant area. Regardless of whether the intake flume is listed separately in the 3013 Order, the intake flume is a water body associated with the Clark Landfill, one of the SWMU listed in the 3031 Order. Collection and analysis of sediment samples adjacent to and in close proximity to the former coke plant area could be used to conclusively demonstrate that contaminants are not migrating from the area. Revise the Wordplay to provide for the collection of sediment samples from the intake flume and from the shoreline along the former coke plant boundary area.

### **Volume 2, Section 5.1 Unit No. 8 (Terminal Lagoon)**

12. The proposed sampling for the North and the Terminal Lagoons is acceptable. However, the proposal to collect subsurface slag at the 2- 4 feet interval is not acceptable. Slag samples should be collected at the 0 - 2' and 2 - 4' depth intervals.

### **Hydrogeological Conditions and Groundwater Sampling Wordplay**

13. The array of monitoring wells and piezometers proposed by ISG are still inadequate to enable us understand the potentially complex flow at the facility. ISG have also failed to include in their proposal of an initial monitoring network any proposal to install intermediate wells as recommended by the U. S. EPA. Information regarding water quality and groundwater head distribution at intermediate depths are necessary during the initial phase of investigation to build a conceptual understanding of groundwater conditions at the site. With regards to piezometers at this site, not only are their utility severely limited in terms of obtaining groundwater quality data, they are also not sanctioned by U.S. EPA as RCRA groundwater monitoring wells. In consideration of what has been proposed in the revised wordplay by ISG, our recommendations for groundwater monitoring well location adjustments and conversion of some piezometers to groundwater monitoring wells are as follows: Refer to U.S. EPA Figure C-1

attachment to the march 16, 2004 letter and the ISG Figure 4-1.

a) **Location A.** At locations **A7, A9, A13 and A14**, nested groundwater monitoring wells must be completed as requested by U.S. EPA in order to obtain perimeter information on groundwater quality and hydrologic gradient data. Convert all proposed piezometers at other **A** locations to groundwater monitoring wells and install all intermediate groundwater monitoring wells across the fill/Calumet sand contact where drilling indicates that the fill and Calumet sand are sufficiently thick to allow for installation of both the water table and intermediate wells, without overlapping of the screened intervals.

b) **Location B.** Retain the water table well, the deep well at the **B6** location and install an intermediate if needed. All other **B** locations are acceptable, however, all proposed piezometers must be converted to groundwater monitoring wells.

c) **Location C.** Install a deep groundwater monitoring well at Location **C1** and an intermediate groundwater monitoring well if needed. Install a water table well at location **C2**.

d) **Location D.** Install nested groundwater monitoring wells at locations **D3 and D4** as requested by U.S. EPA in order to obtain groundwater quality and groundwater gradient information and groundwater flow directions and on-coming groundwater quality in addition to potential pathway information for Markstown. The proposed water table wells ~~are acceptable~~ at location **D** are acceptable.

14. To a large extent, the project area potentially contains various thicknesses of slag-fill. However, based on the proposal to install deep piezometers and to collect slag samples from areas claimed to be un-impacted by the facility operations, we recommend that groundwater samples be collected from these two areas as a preliminary step of establishing background at the facility. Figure 4-1 identifies these two locations as 901P and 902P. As indicated above these piezometers should be converted to ground water monitoring wells. Target horizons should be the mid-point of the Calumet Sands and be constructed with 3 foot well screens. Please ensure that vertical gradient information is determined prior to sampling such that strongly downward gradients would adversely influence a background location. Both filtered and unfiltered groundwater samples should be collected from the midway point within the screens at these locations using appropriate U.S. EPA ground-water quality collection methods. Data obtained should be analyzed within a statistically robust work plan that addresses both temporal and spatial representativeness.

**Volume 1, Section 5.6.1, Unit No. 23, Page 8**

15. According to Figure 3-17 in Volumes 1 through 4, groundwater flow direction in the vicinity of Unit No. 23 is towards the north and North Lagoon. In the revised work

plans, the proposed location for the monitoring well at Unit No. 23 is to the east. ISG should locate the well adjacent to and north of the unit to intercept downgradient flow paths.

**Volume 1, Section 5.2, Unit No. 20, Page 3**

16. ISG indicates that well MW-203 will penetrate the failed area. To evaluate the position of well MW-203 in relation to the landfill failure area, Figure 5-2 should be revised to depict the approximate failure boundaries.

**Volume 3, Section 5.3, Group - C, Units No. 8, No. 9, and No. 10, Page 3**

17. The revised work plans specify that three water table groundwater monitoring wells and one deep piezometer (bottom of Calumet sand) will be installed at Group C Units. On Page 3, the work plan states that "the piezometer will be adjacent to the upgradient water table well to provide coverage more inland on the peninsula." However, the deep piezometer wells are designed to detect potential dense non-aqueous phase liquid (DNAPL) that may have migrated to and ponded on the top of the clay till unit. Because the clay unit in this area apparently slopes to the east in this area (according to Figure 3-9), the deep piezometer would be more effective at detecting DNAPL if located along the eastern side of Group C units. ISG should relocate the deep piezometer adjacent to proposed water table well MW-302 (illustrated in Figure 5-3A).

**Volume 3, Section 5.6, Group - F, Units No. 23, No. 24 and No. 26, Page 4**

18. The revised work plan states the fill between the North Lagoon Area and the property boundary was grouted to prevent seepage from the lagoon and that "the grouting was likely to affect local groundwater flow and quality." To provide a better understanding of how the grouting may influence groundwater, provide additional detail regarding the grouting project and indicate on Figure 5-5A the boundaries of the grouted fill area.

**Volume 3, Section 6.1, Monitoring Well Installation, Page 1**

19. The work plan specifies that "the monitoring wells will be developed after the well is installed by surging and purging the well until the development water clears." A more rigorous methodology for well development is required. Provide additional information that specifies stabilization of field parameters and minimum number of well volumes to be removed in the event that development water remains turbid or field parameters fail to stabilize.

**Volume 3, Section 6.3.3, Hydraulic Conductivity Testing, Page 3**

20. The revised work plan specifies the completion of slug tests at one water table

monitoring well per group. No slug tests are specified for the deep piezometers or the non-SWMU monitoring wells. Due to the general lack of aquifer parameter data at the facility and the importance of gaining a better understanding of aquifer characteristics, ISG should include slug testing of one water table monitoring well per unit, as well as all (SWMU and non-SWMU) deep piezometers and all non-SWMU water table monitoring wells.

**Volume 4, Section 1.2.1.1, Human Health and Ecological Risk Assessment Planning Steps, Page 4**

21. Since there is no site-specific groundwater data (hydrogeological or chemical), it is presently inappropriate to consider human health exposure incomplete. Current/future on-site workers may potentially be exposed to VOC emissions in indoor or outdoor air from shallow groundwater. In addition, since no groundwater use restrictions are in place, future human receptors (e.g., future site workers) may potentially be exposed to contaminated groundwater (e.g., dermal contact with industrial process water). It is recommended that ISG consider future human health receptor exposure to groundwater and include it in the Tier 1/Tier 2 risk screening process.

**Volume 4, Section 4.1.3, Identifying Inputs to Decision, Page 2**

22. Section 4.1.3 indicates that groundwater data will be evaluated on a per-sample or per-group basis by comparing to the project-specific DQOs, which include IDEM criteria (solubility, maximum contaminant levels [MCLs], industrial levels, and default closure levels) and EPA ESLs. It is unclear how this process differs from Tier 1 screening or how comparing the data will meet project-specific DQOs. Therefore, it is recommended that ISG provide additional details or reference the applicable sections in the QAPP regarding selection of DQOs, the specific process for comparing data to DQOs, and the consequences if DQOs are not met.

**Volume 4, Section 4.4.4, Defining the Boundaries of the Study, Page 3**

23. On Page 3, it is stated that if analytes are detected above DQOs in the initial sampling round, subsequent sampling events will be conducted following EPA approval only for the compounds detected above DQOs and only at locations where groundwater impacts were detected. However, the decision to alter the lists of analytes and areas that require sampling cannot be based on one round of sampling. Confirmatory rounds of sampling should be conducted quarterly for one year to account for seasonal variations in water quality. Once these data are evaluated, a reduced analyte list may be considered, following coordination with and approval by EPA.

**Volume 4, Section 6.2, Groundwater Sample Procedures, Page 1**

24. On Page 1, it states that "wells will be purged with a bailer or by low-flow purging techniques" and in the next sentence "purging will be performed using a low-flow peristaltic pump." On Page 2, it is stated that "groundwater samples will be collected using the purging equipment (disposable polyethylene bailer or low-flow peristaltic pump)." VOCs are a potential contaminant of concern (PCOC); therefore, to ensure more representative VOC sampling results, low-flow peristaltic pumps should be specified to purge and sample the groundwater monitoring wells.

#### **Volume 4, Section 6.2.1, Groundwater Levels, Page 2**

25. The revised work plan specifies that groundwater level in the monitoring wells will be measured prior to groundwater purging and sampling. However, the Administrative Order states in Section 52C that the determination of seasonal variations in groundwater flow direction and velocity is required. To assess seasonal water level fluctuations, ISG should specify quarterly measurement of all SWMU and non-SWMU groundwater monitoring wells (water table and deep).

#### **Human Health and Ecological Risk Assessment Planning Steps (vols. 1 & 2)**

##### **General Comments**

26. Although the proposal to use the Region Six CAS has been withdrawn, some terms and methods from the CAS may continue to be proposed in the Work Plans. For example, in Section 1.2.1.1.2 *Ecological Risk Screening Assessment* the Tier 1 and Tier 2 approach for ecological risk assessment does not have a referenced methodology. Region Five requires that ecological risk analysis for Corrective Action follow the *Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, EPA, 1997, (ERAGs) and the *EPA Guidance for Ecological Risk Assessment*, 1999. For ecological risk assessment, the screening phase (ERAGS steps one and two) is termed the Screening Level Ecological Risk Assessment (SLERA) (potentially equivalent to the Work Plan term "Tier 1"). The subsequent phase is termed the Baseline Ecological Risk Assessment (BERA). The Work Plan term "Tier 2" does not appear to be equivalent to the remaining steps of ERAGs. Subsequent documents should use the appropriate ERAGs terminology and methodology.

The Human Health and Ecological Risk Assessment Planning Steps sections of the revised work plans do not provide sufficient detail to assess whether the risk screening procedures are adequate. For Tier 1 risk screening, ISG should present a very detailed and specific discussion including, but not limited to, EPC calculations, potential human health and ecological receptors, risk screening levels, cumulative risk considerations, selection of COPCs, and criteria for conducting Tier 2 risk screening or site-specific risk assessment. For Tier 2 risk screening or site-specific risk assessment, ISG has not provided adequate detail to ensure that the proposed approach is consistent with IDEM

RISC and EPA risk assessment guidance. It is recommended that ISG provide additional specific details on the sampling and analyses, or alternatively, submit a separate human health risk assessment work plan that discusses the necessary Tier 1 and Tier 2 detailed information.

With respect to the ecological risk assessment, it is recommended that ISG provide specific details on the screening approach to demonstrate that ERAGs steps one and two are being followed. The "Tier 2" approach as described for human health/ecological risk assessment does not appear to correspond to the remaining BERA steps. Alternatively, as suggested for the human health risk assessment, ISG could submit a separate ecological risk assessment work plan to provide the necessary Tier 1 and Tier 2 detailed information.

27. Developing conceptual site model diagrams and including an accurate portrayal of all potential current and future human health and ecological receptors is vital for designing a sampling and analysis plan without resulting in significant data gaps. It is **strongly** recommended that ISG have their conceptual site model diagrams reflect preliminary risk assessment conceptual models. This will ensure that sufficient data are collected during this phase of investigation to conduct Tier 1/Tier 2 risk screening or a site-specific risk assessment. If ISG elects not to revise the conceptual site model diagrams to consider all potentially complete exposure pathways for human health and ecological receptors, it is more likely that additional phases of investigation will be required to collect the necessary data. For example, contaminated groundwater may discharge to surface water (e.g., Lake Michigan) that may be used for recreational activities. Thus, clear understanding of the site-specific hydrogeological conditions and the extent of groundwater contamination is essential to assess current and future risks to recreators. The conceptual site models should be revised to reflect consideration of all likely current and future receptors.

### **Specific Comments**

#### **Volume 1, Section 1.2.1.1, Human Health and Ecological Risk Assessment Planning Steps, Page 4**

28. ISG should discuss comparing reporting limits to human health and ecological screening criteria in this section of the work plan. It is noted that method detection limits and/or practical quantitation limits exceed the Ecological Screening Levels for a number of constituents. ISG should clarify how this issue will be addressed. This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.
29. In the response to EPA comments, ISG indicates that an alternative proposal for presentation of data is provided in the revised work plan, but the revised work plan



includes no such proposal. ISG should provide information on how non-detected analytes, biological nutrient elements, and analytes lacking toxicity values will be evaluated in the Tier 1 risk screening. It is important that these data be retained in summary tables presented in the Risk Evaluation Report. In particular, it is inappropriate to remove a chemical lacking toxicity values from summary tables because doing so would, in effect, remove that chemical from consideration as a constituent of potential concern (COPC). Eliminating a chemical as a COPC because toxicity values are not available is not appropriate for human health or ecological risk screening. Additionally, non-detected chemicals must be retained and presented in summary tables, including their range of detection limits and applicable screening values. This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.

30. ISG should clarify field duplicate data will be utilized in the risk screening (i.e., the maximum detected concentration, provided both concentrations are qualified as usable). This comment also applies to Section 1.2.1.1 (Human Health and Ecological Risk Assessment Planning Steps) in Volume 2 and 4.

**Volume 1, Section 1.2.1.1.1, Human Health Screening Risk Assessment Procedures, Page 5**

31. Because the IDEM RISC Industrial Soil Closure Levels are based on 1E-05 risk levels, group-specific hazard indices (HIs) below one (1) do not necessarily indicate that *de minimis* human risk is present at the site; rather, it does indicate that group-specific HI are within an acceptable risk range of 1E-04 to 1E-06. Also, ISG has not discussed cumulative risk across for human health receptors potentially exposed to contamination from multiple groups. ISG should provide a discussion on how they will address cumulative risk.
32. Although ISG indicates that the Tier 2 screening process has been eliminated in the revised work plan, Tier 2 risk screening and the development of critical values (CV) is discussed on page 5 of Section 1.2.1.1.1. The proposed Tier 1 and Tier 2 risk evaluation is not explicitly clear in the work plan such that it is difficult to determine whether the proposed approach is consistent with Indiana Department of Environmental Management's (IDEM's) Risk Integrated System of Closure (RISC) guidance. It is recommended that ISG clarify the proposed approach for evaluating contaminant concentrations at the site with respect to assessing risks to human health. Specifically,
  - The revised work plan indicates that each analyte's exposure point concentration (EPC) will be compared with the IDEM's direct closure criteria, but provides no detail on the actual calculation of the EPC. ISG should indicate how EPC's will be calculated. Section 6 of the RISC Technical Guidance provides explicit instructions for calculating potential exposure concentration (EPCs) that are representative of concentrations at the site and should be compared to default

closure levels.

- The revised work plan continues on to state that a Tier 1 screening Hazard quotient (HQ) will be developed as a result of comparing the EPC to the IDEM default closure value. ISG should clarify that the intent of calculating an HQ and the summation of HQs is to address cumulative risks due to multiple contaminants, and this is performed for both carcinogens and noncarcinogens. The evaluation of cumulative risks should be explained in greater detail.
- Additionally, the work plan indicates that the results of this screening will be used to determine preliminary remediation goals for soil to protect human health and/or focus the area-specific risk assessment. ISG should clarify how these results will result in determining remediation goals.
- It should be noted that the RISC Default Closure Tables, as provided in Appendix 1 of the RISC Technical Guidance, have been recently updated, and starting July 1, 2004, the new values will be in effect.
- The discussion regarding the Tier 2 process should provide the proposed exposure assumption parameter values for the development of Tier 2 screening criteria and CV. ISG should specify whether site-specific equation parameters will be utilized, and if so, include the proposed values. ISG should also specify how group specific data or EPCs will be calculated to compare to group-specific CVs.

It is recommended that ISG either incorporate this information into the their response, or alternatively, prepare a separate Tier 1 and Tier 2 risk screening work plan. Note that this comment also applies to Section 1.2.1.1.1 (Human Health Risk Assessment Procedures) in Volume 2 and 4.

**Volume 1, Section 1.2.1.1.2 Ecological Risk Screening Assessment, Page 6**

33. ISG should indicate which guidance documents will be used to prepare the ecological risk assessment. The statement that the process for ecological risk assessment is identical to the human health (HH) screening procedure should be reconsidered based on the ERAGs. The idea to possibly "use the [ESL] ecological criteria as preliminary remediation goals" is ill-advised. The ESLs are not criteria, as the document states, but highly conservative screening thresholds. If the facility plans to identify early in the assessment process the areas where levels of contamination likely pose unacceptable risks to ecological receptors, for the purpose of identifying a course of remediation, this should be made clear and discussed further.
34. ISG notes that Region 6 CAS worksheets will be completed as part of the ecological site

reconnaissance ; this approach is acceptable. Ideally, this step would have preceded the development of the sampling plan. ISG should understand that the ecological site conceptual models submitted as part of the Risk Evaluation Report will be reviewed and evaluated in accordance with EPA Region 5 policy and the checklist may identify additional areas for risk evaluation and further sampling. This comment also applies to Section 1.2.1.1.2 (Ecological Risk Screening Assessment) in Volume 2 and 4. Copies of correspondence with the natural resource agencies must be included in the risk assessment.

35. In the response to EPA comments, ISG indicates that the suggested ecological risk assessment sources would be considered for chemicals lacking Region 5 Ecological Screening Levels (ESLs). Based on a review of Section 1.2.1.1.2 and Table 4-1, however, it appears that the suggested sources were not reviewed. ISG should specify which sources of screening values were reviewed, and screening values from sources other than Region 5 ESLs should be footnoted in Table 4-1. Please note that the National SSLs, which have been developed for nine metals, take precedent over the ESLs and therefore need to be used in the SLERA. This comment also applies to Section 1.2.1.1.2 (Ecological Risk Screening Assessment) in Volume 2 and 4.
36. It is noted that additional evaluation of bioaccumulative chemicals in the Tier 1 risk screening needs to be included only in areas where sensitive environments (defined in EPA 1997) occur. In the "benchmark operational area-specific risk assessment," dietary exposure to appropriate wildlife receptors should be evaluated for all potentially bioaccumulative chemicals. The Risk Evaluation Report should clearly outline all calculation methods, exposure parameters, and toxicity values that will be used to evaluate risks to wildlife. Further revision of the work plan to address this issue is not necessary at this time, but the Risk Evaluation Report should address this issue according to the above recommendations.

#### **Volume 1, Table 1-1, Investigation Decision Flow Chart**

37. The investigation decision flow chart indicates that anthropogenic background concentrations are going to be compared to the data to identify chemical of concern (COCs) for a site-specific risk assessment. Eliminating COPCs or COCs using anthropogenic background is not appropriate.
38. The investigation decision flow chart implies that unless all the concentrations exceed established human health or ecological risk screening criteria, no further action (NFA) is necessary. The decision flow chart should be revised to indicate that only if all concentrations fall below established human health or ecological screening criteria is NFA is necessary.
39. The investigation decision flow chart does not appear to present the Tier 2 risk screening

step. The investigation decision flow chart should be revised to include how the Tier 2 risk screening process will be incorporated into the investigation.

## **Quality Assurance Project Plan**

### **GENERAL COMMENTS**

40. In response to the EPA request for documentation of previous analytical data, ISG states that historical data could not be substantiated to the degree required by the Region 5 QAPP instructions. Therefore, historical data was not used to select sampling locations and was not included in the revised work plans. ISG should provide tabular summaries of all available analytical data, along with a detailed explanation of how the data fail to meet the specifications of the Region 5 QAPP instructions. The Boring Location Map, which appears as Figure 3-5 in Volumes 1 through 4, should be reviewed to ensure that boring locations with analytical results are illustrated.
41. The following inconsistencies were noted in the tables associated with the QAPP and require clarification:
  - Table 1-3 identifies the analyte list for groundwater analyses. Revise the table to provide the analytical method reference number as well as the acceptance criteria to be used for the following parameters: boron, sodium, ammonia, total organic carbon (TOC), and chloride.
  - Table 1-4 indicates that for sulfide analysis, SW-846 Method 9030 will be used. Clarify why SW-846 Method 9030B has not been referenced.
  - The text of the QAPP as well as Table 4-1 indicate that EnCore samples for volatile organic compounds (VOCs) will be extracted by SW-846 Method 5035; however, none of the tables provide a reference to this method. Clarify and ensure that the QAPP and the associated tables are comprehensive and consistently identify all methods to be used for the sampling events.
  - None of the tables provided includes the preparation method(s) to be used for the inorganic methods. Clarify and provide this information for each parameter to be analyzed.
  - Table 4-1 which provide the sample container, preservation and holding time information identifies the analytical method for polycyclic aromatic hydrocarbons (PAHs) as "827°C". Revise the table to correctly identify the method as "8270C".
42. As per the *RCRA QAPP Instructions*, U.S.EPA Region 5 requirements the QAPP must

be include a detailed discussion of how the data will be assessed as to whether the originally defined objectives were satisfied. Ensure that all project data are assessed by capable facility representatives in accordance with the Region 5 Data Quality Assessment (DQA) Policy. For projects involving large numbers of samples, or to evaluate sample matrix interference and its effect on final data, statistical analysis and/or hypothesis testing may be required. Guidance on procedures, methods, rationale and equations for evaluating data of this type is offered in *Guidance for Data Quality Assessment - Practical Methods for Data Analysis* (EPA QA/G-9, July 2000).

#### **Quality Assurance Project Plan (Volume 5)**

##### **Volume 5, Section 1.1.3, The Project Proposal, Proposal Objectives, and Decision Statements, Page 3**

43. As required by the *RCRA QAPP Instructions, U.S.EPA Region 5*, ISG must provide a discussion of the consideration of human health risk-related issues that may impact field activities. Such issues that should be considered may be: land use planning and assumptions, selection of detection limits/reporting limits, risk-based screening options, background sampling, and data quality for assessing human health risk.

##### **Volume 5, Table of Contents, Page 9**

44. In accordance with the *RCRA QAPP Instructions, U.S.EPA Region 5* and *EPA QA/R-5*, immediately following the list of tables and figures in the table of contents, a complete listing of QAPP recipients must be included. Ensure that the personnel that are identified on the Signature Page are included in this Distribution.

##### **Volume 5, Section 1.4.2.4, Physical Parameters, Page 44**

45. This section of the QAPP indicates that several field parameters will be analyzed for during the project. The last sentence of the paragraph states that "The use of the listed characterization procedures or analyses will be described in the individual work plans, as appropriate." Although it is acceptable to reference other project-related documents for information, it is critical that very specific references to where this information may be found be provided in the QAPP. Revise the QAPP to provide a very clear reference to specific work plans (e.g., page and section number) or provide a tabular summary of the information within the QAPP itself.

##### **Volume 5, Section 1.4.3, Laboratory Analysis, Page 33**

- 46.. The revised QAPP states that "sulfide, boron, chloride, ammonia and chemical oxygen demand (COD) will be collected for groundwater samples." However, Table 1-3, which lists the parameters to be collected for groundwater, identifies several

additional parameters that were not noted in the text, specifically sodium, alkalinity, hardness, and TOC. Additionally, COD is not listed as an analyte of interest in Table 1-3. Finally, Table 1-3 indicates that hexavalent chromium will also be a parameter of interest; however, Section 1.4.2.3 only lists "chromium." Clarify and ensure that the text and associated tables are consistent and clearly identify a comprehensive parameter list for each media to be sampled.

**Volume 5, Section 1.5.1, Rationale of Selected Sampling Locations, Page 35**

47. The revised QAPP states that "the sample locations for the Groups are depicted on Figures 5-1 through 5-7 and the rationale for the sample collections are presented below." This section discusses past sampling results but ISG needs to provide the following information:

- A list of all environmental measurements to be performed for the current sampling event.
- A tabulated description and itemization of all specific tasks to be performed in the generation of field and laboratory data, linked to every specific objective and decision rule defined for the project
- A summary table listing, for each sampling location, the total numbers of samples (including investigative, quality control [QC], split and reserve), sample type or matrix, and all measurements to be performed, differentiate where applicable to critical measurement from the noncritical measurements. Critical measurements are those specifically emphasized in project decision rules. Noncritical measurements are those to be performed in conjunction with the reporting of identified critical measurements.

**Volume 5, Section 14.1, Page 1**

48. This section of the QAPP discusses the contents of the project quality assurance reports. As required by *RCRA QAPP Instructions, U.S. EPA Region 5*, revise the QAPP to ensure that all data validation and assessment results since the last report are included.

**Volume 5, Appendix A**

49. Appendix A contains the Standard Operating Procedures (SOPs) for the field investigation. As noted in the General Comment A from the General Guidance Comments, there is a request to perform field screening for volatile organic compounds of soil cores, using organic vapor detection devices such as a PID or FID. Please include an SOP for headspace analyses of volatile compounds in soil samples collected during

the investigation.

Group	Units/AOC	Figure Number
A	No. 1 - Blast Furnace Filter Cake Pile	2-1
	No. 67 - Sinter Plant Exterior	
	No. 68 - Sinter Plant Feed Stock Piles	
B	No. 20 - Clark Landfill	2-2
C	No. 8 - Terminal Lagoon	2-3
	No. 9 - Oil Skimmer Tank	
	No. 10 - Terminal Lagoon Sludge Pit	
D	No. 7 - "The Hill"	2-4
E	No. 73 - Quenching Area Acid Pit	2-5
F	No. 23 - Filter Backwash Pile	2-6
	No. 24 - North Lagoon	
	No. 26 - Old Oily Sludge Pit	
G	No. 47 - Central Waste Treatment Plant Sludge Pile	2-7
H	No. 65 - Former Coke Plant Decanter Area	2-8
	AOC - Former Coke Plant No. 1	

### 2.3.1 Group - A, Units No. 1, No. 67 and No. 68 (Sinter Plant Area)

Group - A consists of three Units: the Blast Furnace Filter Cake Pile (No. 1), Sinter Plant Exterior (No. 67), and the Sinter Plant Feed Stock Piles (No. 68). These areas were grouped together because of their close proximity and direct relationship to the Sinter Plant. The US EPA identified the feed stock piles (Unit No. 68) and the potential spillage (Unit No. 67) of these materials around the Sinter Plant as concerns. Additionally, US EPA indicated concern with the Blast Furnace Filter Cake Pile (Unit No. 1). This pile is located adjacent to the Sinter Plant and is one of the primary residuals blended to form the Sinter Plant feedstock material. Since the three Units are located in the vicinity of the Sinter Plant, and/or are associated with the plant feedstock materials, they were combined into a single Group.

#### 2.3.1.1 Unit No. 1 (Blast Furnace Filter Cake Pile)

The blast furnace filter cake solids are generated by the water washing of the blast furnace gases. The scrubber water slurry from the blast furnace gas washers is distributed via parshall



## 1.0 INTRODUCTION

ISG Indiana Harbor, Inc. (ISG-IH) is an operating steel mill. The steel mill produces a variety of flat-rolled steel products. The steel mill complex is located at 3001 Dickey Road in East Chicago, Indiana. The location can be further described as in Township 37 North, Range 9 West, Sections 9, 10, 15, and 16. More than 80% of the steel mill complex is located on a Peninsula extending northward into Lake Michigan. The Peninsula was made from the controlled filling of the lake with iron and steel-making slag.

Tecumseh Redevelopment, Inc. (Tecumseh) is the owner of land immediately adjacent to ISG-IH that was formerly part of the steel mill complex. The Tecumseh property is occupied in part by a steel manufacturing business unrelated to ISG-IH or Tecumseh. The ISG-IH and Tecumseh properties are shown on Figure 1-1 Location Map and Figure 1-2 Layout Map.

### 1.1 Overview of Administrative Order

On October 23, 2003, the United States Environmental Protection Agency (US EPA) issued a RCRA Section 3013 Administrative Order (US EPA Docket No. R 3013-5-03-002) to ISG-IH and Tecumseh. The Order demands both parties to prepare a proposal for monitoring, testing, analysis, and reporting to ascertain the nature and extent of hazards posed by hazardous wastes that are present or may have been released at 14 identified Units and one Area of Concern (AOC) at the facility. ISG-IH and Tecumseh do not have information that indicate that hazardous wastes regulated by US EPA or the Indiana Department of Environmental Management (IDEM) are present or have been released at any of the 14 Units or the one AOC identified in the Order.

#### 1.1.1 Description of the Administrative Order

The Administrative Order identified 14 Units and one AOC. These Units are listed below with a brief description.

Unit Number	Unit Name	Unit Description	Unit Owner
1	Blast Furnace Filter Cake Pile	Solids removed from air scrubber, which are dewatered and recycled into the Sinter Plant.	ISG-IH
7	"The Hill"	Closed historic facility landfill.	ISG-IH
8	The Terminal Lagoon	A portion of a process water recycling facility, usually operated below lake levels. Thus, groundwater is likely an influent to the lagoon.	ISG-IH

# Hydrogeologic Conditions Work Plan

ISG-IH & Tecumseh  
Revision 1, May 2004  
Volume 3 Section 1  
STS Project No. 1-08741Y  
Page 2 of 4

Unit Number	Unit Name	Unit Description	Unit Owner
9	Terminal Lagoon Oil Skimmer Tank	The oil skimmer tank is a unit no longer in operation.	ISG-IH
10	Terminal Lagoon Sludge Pit	Water was drained from the Terminal Lagoon sludges back into the process water. The sludges were disposed as this practice ceased years ago.	ISG-IH
20	Clark Landfill	A facility landfill undergoing closure under an IDEM-approved closure plan.	ISG-IH
23	Filter Backwash Pile	A now-closed area that was used to drain water from solids trapped on the backwash filter.	ISG-IH
24	North Lagoon	An active NPDES permitted facility used for re-circulating process waters from the milling operations. Wastewater discharges to the lagoon have an NPDES permit and are monitored regularly.	ISG-IH
26	Old Oily Sludge Pit	An area on the south side of the lagoon that was used in the historic past to dewater sludge. This Unit is no longer in use.	ISG-IH
47	Wastewater Treatment Sludge Pile	Reportedly this area was used to stockpile wastewater treatment sludge outside of the Central Treatment Plant. The sludge has not existed for a number of years.	Tecumseh
65	Former Coke Plant Decanter Area	Reportedly located adjacent to the Indiana Harbor Shipping Canal. The coke plant was demolished in the early 1980's. Historic Sanborn maps depict coal piles on the land adjacent to the Indiana Harbor.	Tecumseh
67	Sinter Plant	The sinter plant is a fully functioning part of the facilities operations. The sinter plant fuses fines and reclaimed fines for reuse in the blast furnaces.	ISG-IH
68	Sinter Plant Feedstock Piles	Piles of reclaimed fines for processing in the sinter plant.	ISG-IH
73	Old Quenching Area	In the Hockett operations area of the facility, iron rich material is separated from slag for recycling. Allegedly, this area was also used to dispose of spent acid.	ISG-IH
AOC	Former Coking Plant No. 1	The former coke plant No. 1 is suspected of being a source of soil and groundwater impacts.	Tecumseh

The SWMUs have been organized into eight Groups for the project based on proximity and similar operations to one another. The groups will share data as appropriate because of their close proximities and similarity of operations. The groups are:

J. Adenuga



20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606

**TECHLAW INC.**

PHONE: (312) 578-8900

FAX: (312) 578-8904

**RZ2.R05705.01.ID.064**

August 2, 2000

Mr. Brian Freeman  
U.S. Environmental Protection Agency  
Region 5 DE-9J  
77 West Jackson Boulevard  
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W-00-017; Work Assignment No. R05705; Multi-Site  
Sampling and Analysis Support; LTV Steel, Inc., East Chicago, Indiana; EPA ID  
No. IND005462601; Field Sampling Report; Task 05 Deliverable

Dear Mr. Freeman:

Please find enclosed the Field Sampling Report for the LTV Steel facility in East Chicago, Indiana. The two-day field sampling event took place on July 11-12, 2000. This report provides an overview of the sampling activities conducted by TechLaw representatives and a photographic log showing the condition of the site.

Please contact me or Mr. Terry Uecker at (312) 345-8974 if you have any questions.

Sincerely,

John G. Koehnen  
Regional Manager

cc: F. Norling, U.S. EPA Region 5, w/o attachments  
J. Adenuga, U.S. EPA Region 5  
W. Jordan, Central Files  
T. Uecker  
Chicago Central Files



**FIELD SAMPLING REPORT**

**LTV STEEL, INC.  
EAST CHICAGO, INDIANA  
EPA ID No. IND005462601**

**Submitted to:**

**Mr. Brian Freeman  
U.S. Environmental Protection Agency  
Region 5 DE-9J  
77 West Jackson Boulevard  
Chicago, Illinois 60604**

**Submitted by:**

**TechLaw, Inc.  
20 North Wacker Drive  
Suite 1260  
Chicago, Illinois 60606**

<b>EPA Work Assignment No.</b>	<b>R05705</b>
<b>Contract No.</b>	<b>68-W-99-017</b>
<b>EPA WAM</b>	<b>Brian Freeman</b>
<b>Telephone No.</b>	<b>(312) 886-2720</b>
<b>EPA Technical Advisor</b>	<b>Jonathan Adenuga</b>
<b>Telephone No.</b>	<b>(312) 886-7954</b>
<b>TechLaw WAM</b>	<b>Terry Uecker</b>
<b>Telephone No.</b>	<b>(312) 345-8974</b>

**August 2, 2000**

## **SPLIT SAMPLING REPORT**

**LTV STEEL, INC.  
EAST CHICAGO, INDIANA  
EPA ID No. IND005462601**

### **SUMMARY OF FIELD ACTIVITIES**

On July 11 and 12, 2000, a TechLaw, Inc. (TechLaw) field team conducted sampling at the LTV Steel, Inc. (LTV) facility in East Chicago, Indiana. The TechLaw field team was comprised of Mr. Todd Quillen, Mr. Terry Uecker, Ms. Demaree Collier and Ms. Kristi Pawski. The split sampling was conducted at the request of Mr. Brian Freeman, the U.S. EPA Region 5 Work Assignment Manager.

The purpose of this sampling event was to determine whether a release of hazardous wastes or hazardous constituents has occurred from various Solid Waste Management Units (SWMUs) at LTV. Samples were collected by members of the TechLaw team and were split with personnel from the LTV contractor, A.D. Little. In addition to the TechLaw team, the following personnel were present at the site during TechLaw's sampling visit:

Mr. Mike Sickles - Indiana Department of Environmental Management  
Mr. Al Cross - LTV Steel, Inc.  
Mr. Keith Nagel - LTV Steel, Inc. Cincinnati Corporate Office  
Mr. Keith Nay - Engineer, LTV Steel, Inc.  
Mr. Dick Rupnow - Engineer, LTV Steel, Inc.  
Mr. Bill Dowling - A.D. Little  
Ms. Amy Lawrence - A.D. Little  
Dan Gunnum - Paramount Environmental Services  
Ed DeLuca - Paramount Environmental Services

Currently 81 SWMUs and 5 Areas of Concern (AOCs) have been identified at the LTV site. However, during and after the initial site visit on February 23, 2000, a subset of specific SWMUs was selected by U.S. EPA for this sampling event. These SWMUs are:

- SWMU 11 - Ladle Metallurgy Facility Baghouse
- SWMU 28/29 - No. 3 Sheet Mill Spent Pickle Liquor Tanks
- SWMU 45 - No. 2 Tin Mill Waste Sodium Dichromate Truck Loading Station
- SWMU 50 - No. 2 Tin Mill Waste Chromic Acid Tank
- SWMU 65 - Coke Plant Decanter Site

A total of eight groundwater and seventeen soil samples were collected, including quality control (QC) samples, during the sampling event. It was also decided by U.S. EPA that roll shop waste samples be collected from the 84" Strip Mill, in addition to the SWMU samples, in order to characterize the waste for chromium and pH. All samples were analyzed by the U.S. EPA Central Regional Laboratory (CRL), with the exception of anions and pH, which were sent to EnChem, Incorporated in Madison, Wisconsin for analysis.

A Facility Map and Sampling Map Location is presented in Appendix A. A Photographic Log is provided in Appendix B.

The TechLaw team arrived at the LTV facility on July 11, 2000 at approximately 0900 and met with Mr. Cross, Mr. Nagel, Mr. Dowling, Ms. Lawrence and Mr. Sickles to set up the sampling schedule. Since utility locations were not determined prior to the sampling date, it was decided that LTV engineers (Mr. Nay and Mr. Rupnow) would accompany Mr. Quillen to sample groundwater in order to assist in locating any utility lines as potential sampling locations were selected. After Mr. Quillen determined a proposed sample location, the engineers would confirm the presence or absence of any utility lines. The meeting concluded and the TechLaw team departed to conduct sampling activities at approximately 1005.

#### Groundwater Sample Collection

Mr. Quillen, Ms. Lawrence, Mr. Sickles, Mr. Nagel, Mr. Nay, and Mr. Rupnow began groundwater sampling at the Coke Plant Decanter Site (SWMU 65). Mr. Quillen marked two areas for sampling along the Indiana Harbor Shipping Canal and four areas along the west fence. Mr. Nay and Mr. Rupnow then left to check for the presence of utilities at the marked locations.

Mr. Nay returned at 1230 with the information that none of the proposed sampling locations contained underlying utilities, and each of the selected locations were acceptable for drilling. Drilling commenced at 1235. A hollow stem auger mounted on a Geoprobe was used to penetrate six well borings at SWMU 65. The six wells were drilled by penetrating the auger, including a PVC screen inserted into the auger, directly into the ground until groundwater was encountered. The auger was then lifted out of the boring, with the PVC screen remaining in place. A peristaltic pump was then used to purge and sample the groundwater through the PVC screen. At the location of the first well, the water table was encountered at approximately 5.5 feet below ground surface (bgs), as measured by the drillers' interface probe. The first liquid to emerge from all six borings was black, but after several minutes the liquid became clear. Between a half-gallon to one-gallon of groundwater was purged before a sample was collected from each well. Groundwater samples were analyzed for SVOCs and total metals. After filling the sample jars, the boring was abandoned in place and filled with bentonite chips. All groundwater samples (S01 - S06) were collected in this manner. All groundwater samples were split with the facility. Several boring locations were attempted for samples S03 and S04 due to the presence of building foundations. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.

## Soil Sample Collection

Ms. Collier, Mr. Uecker, Ms. Pawski, Mr. Dowling and Mr. Cross began collection of soil samples at SWMU 45, Waste Sodium Dichromate Loading Station. Upon arriving at SWMU 45, it was noted that the gravel surrounding the loading station appeared to be freshly scraped, and that the bright blue staining observed during the visual site inspection was no longer apparent. Four composite samples were collected from this SWMU (S16 - S19), with one composite sample being collected from each of the four sides surrounding the loading station. Each composite sample consisted of four grab soil samples, spaced approximately 1 to 3 feet apart, from around one side of the loading station. All four grab samples were then placed into a stainless steel bowl to be composited. The soil in the bowl was thoroughly mixed and composited as one sample in one sample jar. This represented one composited sample collected from one side of this SWMU. All composite samples were collected in a similar manner from every SWMU. Soil samples collected at SWMU 45 were analyzed for TCLP and/or total metals and cyanide. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.

SWMU 50, the No. 2 Tin Mill Waste Chromic Acid Tank, is an above-ground storage tank (AST) which is located outside and has a secondary containment wall surrounding the unit. The tank contains waste chromic acid generated from metal finishing operations. It was observed that water had accumulated on the ground under the chromic acid tank. According to Mr. Cross, the water was rainwater that had collected from heavy rainfalls in the previous few days. A large grate was present approximately 3 inches under the surface of the collected water. Mr. Cross stated that the grate is a sump which pumps any collected water into the facility process waste water. A green substance was observed on the concrete under the standing water, which, according to Mr. Cross, was moss. When Alconox and deionized water used in equipment decontamination were poured into the grate/sump (per the direction of Mr. Cross), the water turned green and began to bubble.

Four samples were collected from around the secondary containment wall at SWMU 50. Each of these samples was composited in a manner similar to the samples collected at SWMU 45. Four grab samples were collected at to produce composite samples S21 and S23, while five grab samples were collected to produce composite samples S20 and S22. In the same manner as SWMU 45, one composite sample was collected from outside one wall of SWMU 50. The grab samples were spaced approximately 2 to 4 feet apart at each location and were then composited into appropriate composite samples. Soil samples collected at SWMU 50 were analyzed for TCLP and/or total metals. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.

SWMU 11, the Ladle Metallurgy Facility Baghouse (LMF) is a baghouse that generates cadmium dust from process operations at the site. LTV is in the process of installing a pad underneath the baghouse; at the time of sampling, this area was covered with thick plastic sheeting. A rolloff box is located directly adjacent to the LMF. The rolloff box was observed to

be completely sealed, with a covered conveyor that is used to transport the cadmium dust from the baghouse into the rolloff. According to Mr. Cross, the box is always covered. No dust was observed escaping to the environment during sampling activities. Four samples were collected from around the LMF (S24, S25, S26 and S27). The soil cover in this area was extremely thin, so the samples were collected by sweeping an area approximately 3 feet by 15 feet in size, and then compositing the material in a plastic bowl. The soil in a small area where sample S26 was collected was thicker than in the other areas surrounding SWMU 11. During collection of sample S26, it was observed that soil deeper than 1/4" had a yellow-colored tinge that was significantly different than the uppermost 1/4" of soil. Soil samples collected at SWMU 11 were analyzed for TCLP and/or total metals. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.

The No. 3 Sheet Mill Spent Pickle Liquor Tanks (SWMUs 28/29) are above ground storage tanks which are located outside the No. 3 Sheet Mill. A secondary containment wall surrounds the tanks. Three composite samples were collected from around the secondary containment wall at this SWMU (S28, S29 and S30). Each of these samples was composited from five locations. During the collection of sample S28, it was observed that soil an inch or less beneath the surface had a noticeably reddish color. Soil samples collected at SWMUs 28/29 were analyzed for TCLP and/or total metals, anions and pH. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.

All samples collected from the SWMUs were split with the facility.

#### Roll Shop Waste Samples

Roll shop waste samples from the 84" Strip Mill were collected on July 12, 2000. Ms. Collier, Mr. Quillen, Mr. Uecker, Mr. Dowling, Ms. Lawrence, Mr. Sickles and Mr. Cross were present during sample collection. Grinding stations in the strip mill generate roll shop waste which accumulates in a collection pit. Metal grindings and wastewater from each grinding station are transported through troughs to the large collection pit. It was stated by Mr. Cross that a vacuum truck collects the waste material every couple months and transports the waste off site for disposal.

A total of 16 samples were collected from the collection pit by generating a sampling grid. Each square in the grid measured 2 feet by 2 feet, and the entire grid was 5 squares by 13 squares. Since the waste was less than one inch thick, only one sample was collected from each grid location. In some instances, there was not sufficient volume in a grid to collect a waste sample, therefore these locations were not sampled. A total of 16 grids were sampled and all samples collected were split with the facility. Samples collected at the 84" Strip Mill were analyzed for total chromium and pH. Information regarding sampling locations and QA/QC samples are provided in Table 1 and sample location maps are provided in Appendix A.



**Table 1**  
**Sample Locations and QA/QC Sample Information**

Sample Number <sup>1</sup>	Sample Location <sup>2</sup>	QA/QC Sample Information
2000RC02S01	Tar Storage Tanks #1	MS/MSD
2000RC02S02	Tar Storage Tanks #2	
2000RC02R03		Rinsate Blank from Auger Stem
2000RC02S03	Equipment Maintenance Shed	
2000RC02S04	North Decanter Tank	
2000RC02S05	South Decanter Tank	
2000RC02D05	South Decanter Tank	Duplicate
2000RC02S06	Downgradient Decanter Tanks	
2000RC02S07	N/A	
2000RC02S08	N/A	
2000RC02S09	N/A	
2000RC02S10	N/A	
2000RC02S11	N/A	
2000RC02S12	N/A	
2000RC02S13	N/A	
2000RC02S14	N/A	
2000RC02S15	N/A	

**Table 1 (Continued)**  
**Sample Locations and QA/QC Sample Information**

2000RC02S16	SWMU 45 Waste Sodium Dichromate Loading Station	
2000RC02D16	SWMU 45 Waste Sodium Dichromate Loading Station	Duplicate
2000RC02S17	SWMU 45 Waste Sodium Dichromate Loading Station	
2000RC02S18	SWMU 45 Waste Sodium Dichromate Loading Station	
2000RC02S19	SWMU 45 Waste Sodium Dichromate Loading Station	
2000RC02S20	SWMU 50 No. 2 Tin Mill Waste Chromic Acid Tank	
2000RC02S21	SWMU 50 No. 2 Tin Mill Waste Chromic Acid Tank	
2000RC02S22	SWMU 50 No. 2 Tin Mill Waste Chromic Acid Tank	
2000RC02S23	SWMU 50 No. 2 Tin Mill Waste Chromic Acid Tank	
2000RC02S24	SWMU 11 Ladle Metallurgy Facility Baghouse	
2000RC02S25	SWMU 11 Ladle Metallurgy Facility Baghouse	
2000RC02S26	SWMU 11 Ladle Metallurgy Facility Baghouse	
2000RC02S27	SWMU 11 Ladle Metallurgy Facility Baghouse	

**Table 1 (Continued)**  
**Sample Locations and QA/QC Sample Information**

2000RC02B27	NA	Rinsate Blank - collected after Sample 2000RC02S27
2000RC02S28	SWMU 28/29 Sheet Mill Spent Pickle Liquor Tanks	
2000RC02S29	SWMU 28/29 Sheet Mill Spent Pickle Liquor Tanks	
2000RC02S30	SWMU 28/29 Sheet Mill Spent Pickle Liquor Tanks	
2000RC02S31	NA	Blind Duplicate - sent to EnChem Laboratory
2000RC02S32	84" Strip Mill Roll Shop - Grid D1	
2000RC02S33	84" Strip Mill Roll Shop - Grid E3	
2000RC02S34	84" Strip Mill Roll Shop - Grid A3	
2000RC02S35	84" Strip Mill Roll Shop - Grid A4	
2000RC02S36	84" Strip Mill Roll Shop - Grid A5	
2000RC02S37	84" Strip Mill Roll Shop - Grid B4	
2000RC02S38	84" Strip Mill Roll Shop - Grid B3	MS/MSD
2000RC02D38	84" Strip Mill Roll Shop - Grid B3	Duplicate
2000RC02S39	84" Strip Mill Roll Shop - Grid C2	
2000RC02S40	84" Strip Mill Roll Shop - Grid C3	
2000RC02S41	84" Strip Mill Roll Shop - Grid C4	
2000RC02D41	84" Strip Mill Roll Shop - Grid C4	Duplicate
2000RC02S42	84" Strip Mill Roll Shop - Grid C5	

**Table 1 (Continued)**  
**Sample Locations and QA/QC Sample Information**

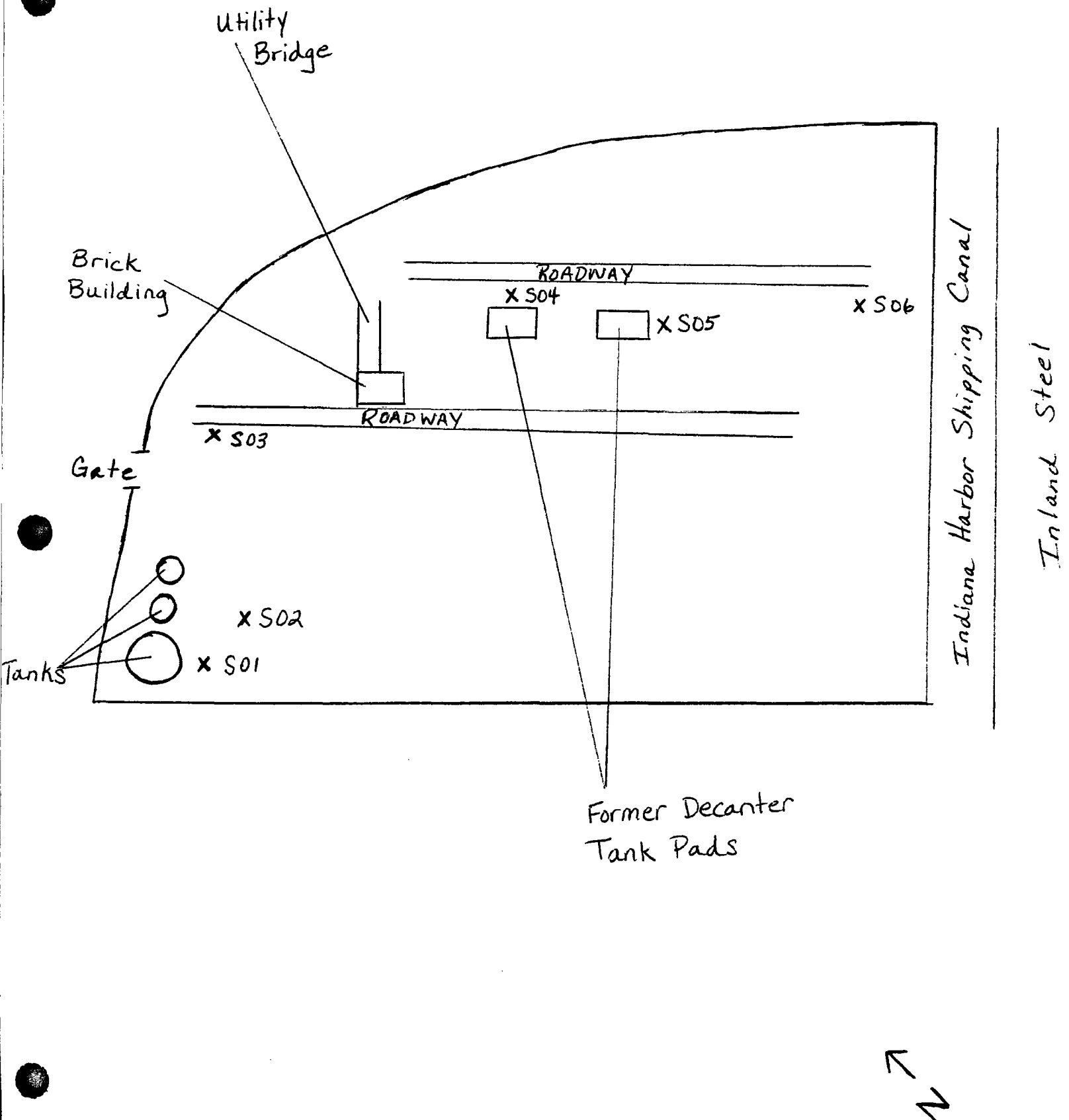
2000RC02S43	84" Strip Mill Roll Shop - Grid C6	
2000RC02S44	84" Strip Mill Roll Shop - Grid D3	
2000RC02S45	84" Strip Mill Roll Shop - Grid D4	
2000RC02S46	84" Strip Mill Roll Shop - Grid D5	
2000RC02S47	84" Strip Mill Roll Shop - Grid D6	

- 1 Sample location descriptions in the report text refer to last three characters in Sample Number. For example, Sample Number "2000RC02S01" is identified in the report text as "S01".
- 2 N/A indicates that this Sample Number was previously generated by the U.S. EPA Region 5 CRL, but a sample was not collected.

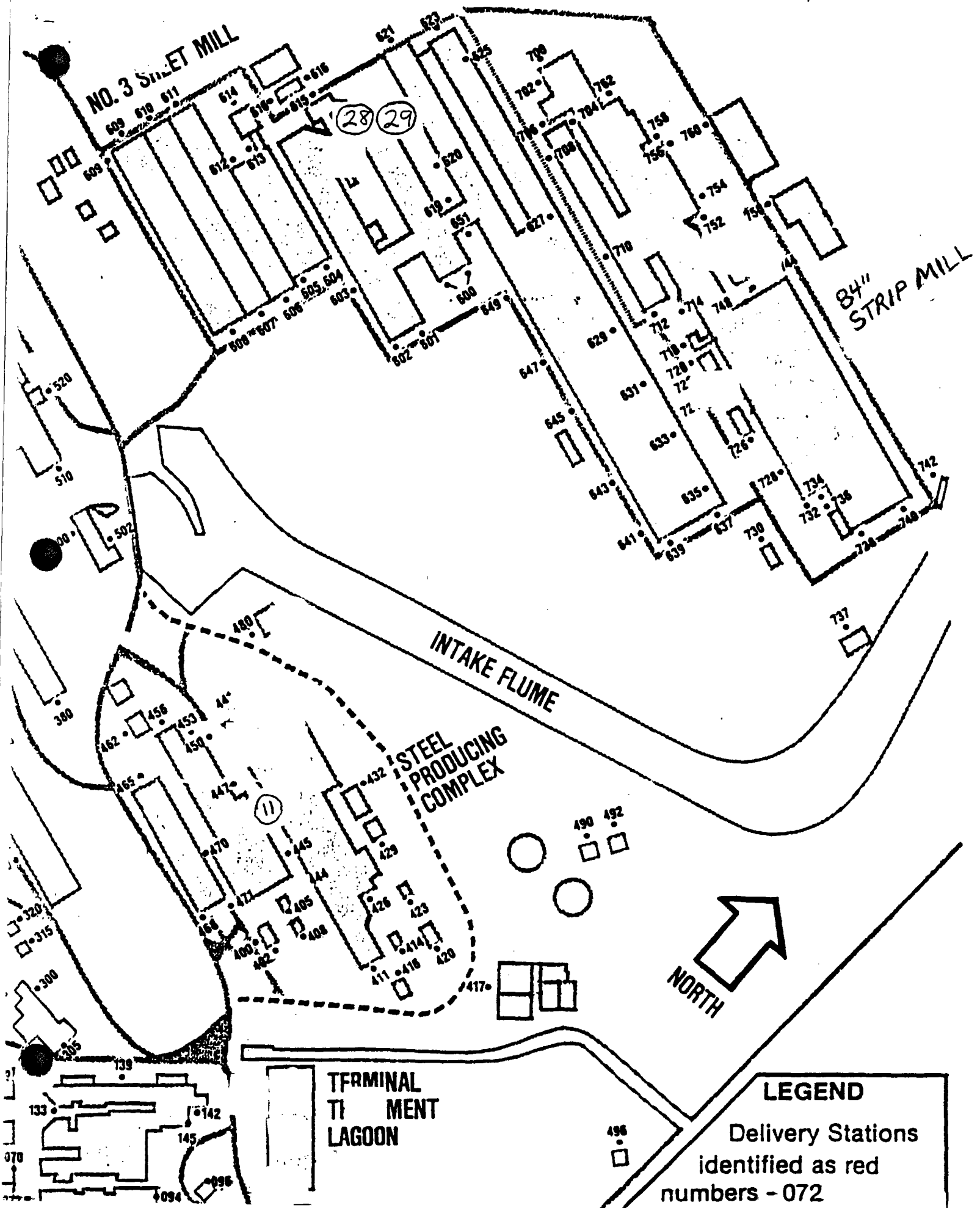
**APPENDIX A**

**LTV STEEL, INC. - SAMPLE LOCATION AND FACILITY MAPS**

# GROUNDWATER SAMPLING LOCATION MAP

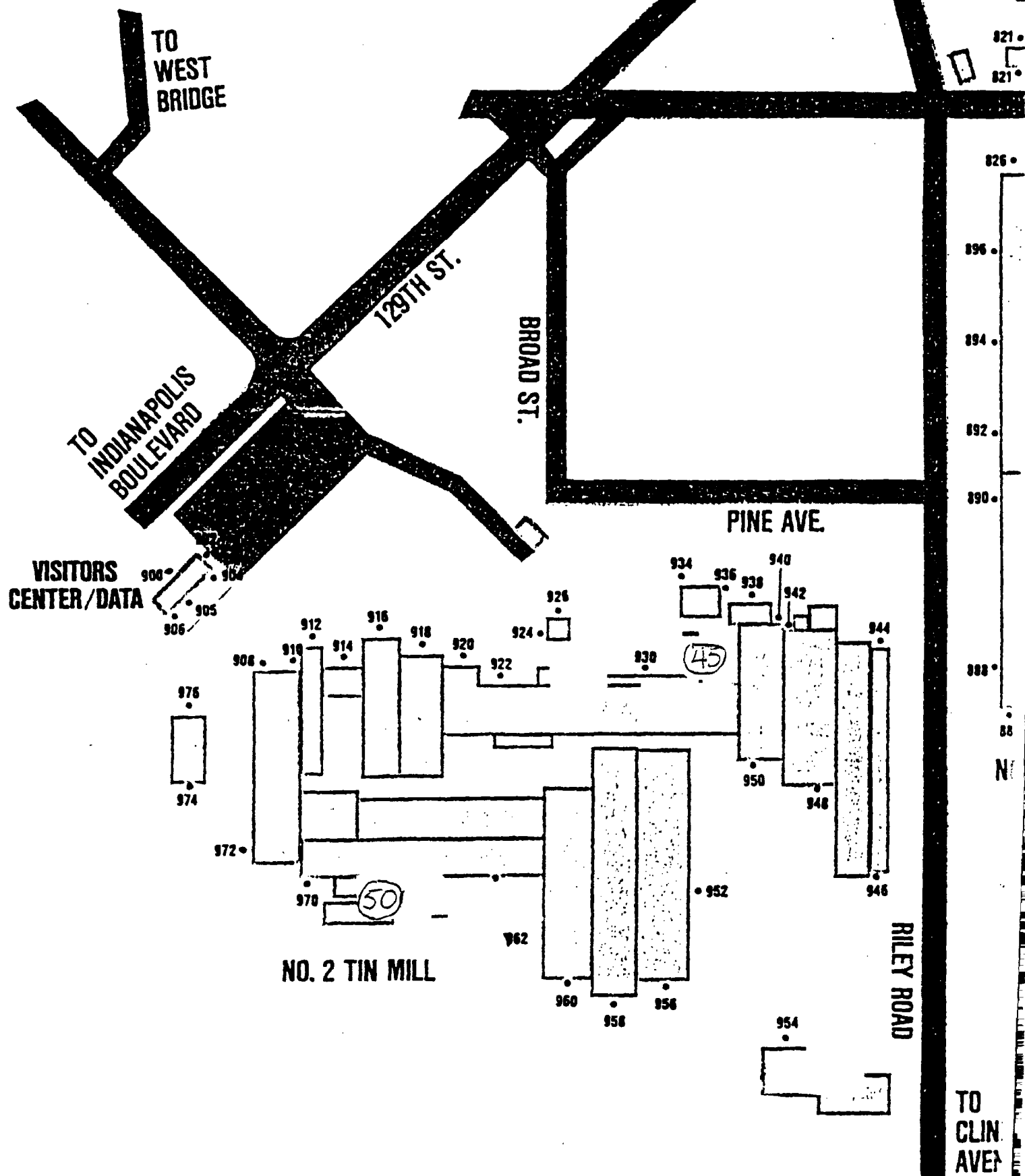


SWMU MAP and  
84" Strip Mill Map



Swmu map

SPARES





**APPENDIX B**

**LTV STEEL, INC. - PHOTOGRAPHIC LOG**



Photograph No.: 1-1  
Direction: SW

Time: 1235  
Date: July 11, 2000

Description: View of sampling location S01 at SWMU 65, near the previous location of a tank.





Photograph No.: 1-2  
Direction: SW

Time: 1322  
Date: July 11, 2000

Description: View of sampling location S02 located at SWMU 65.





Photograph No.: 1-3

Direction: Down

Time: 1457

Date: July 11, 2000

Description: View of the screen at sampling location S03 at SWMU 65. Note the ring of potential product and apparent product smearing on the screen.





Photograph No.: 1-4  
Direction: W

Time: 1458  
Date: July 11, 2000

Description: View of groundwater sample S03 being collected at SWMU 65.





Photograph No.: 1-5  
Direction: NW

Time: 1525  
Date: July 11, 2000

Description: Collection of the groundwater sample at sampling location S04 at SWMU 65.  
Note the tubing leading to from the peristaltic pump to the sample bottles.





Photograph No.: 1-6

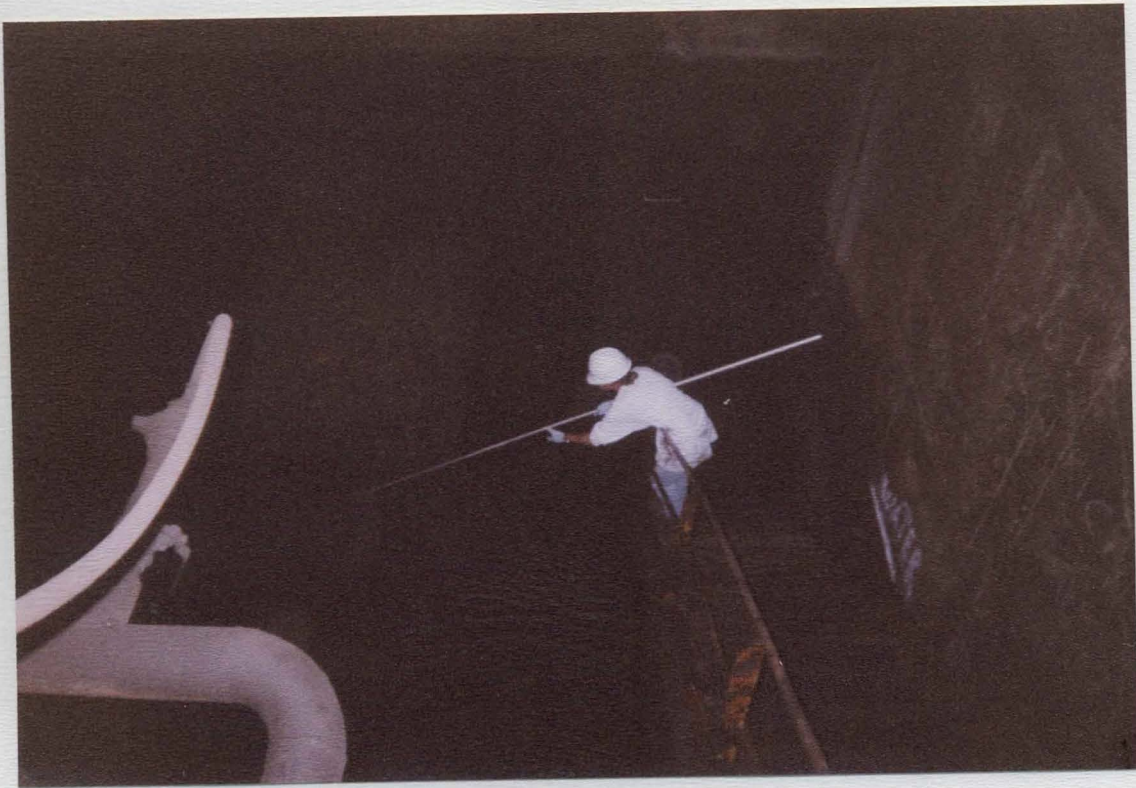
Direction: N

Time: 1550

Date: July 11, 2000

Description: View of sample S05 being collected at SWMU 65. The mill is visible in the background.





Photograph No.: 1-7  
Direction: W/Down

Time: 1124  
Date: July 12, 2000

Description: View of roll shop waste sample collection at the 84" Strip Mill at Grid A-4.





Photograph No.: 1-8  
Direction: NW

Time: 1227  
Date: July 12, 2000

Description: Photograph of the recalibration of the pH meter in the 84" Strip Mill. This photograph was taken after measuring the pH of sample S32.





Photograph No.: 1-9  
Direction: ENE

Time: 1303  
Date: July 12, 2000

Description: View of water flowing into the roll shop waste pit in the 84" Strip Mill. Note the pipe located next to the staircase from which the waste material is expelled.



Photograph No.: 1-10

Direction:

Time:

Date: July 12, 2000

Description: Flash did not function. No photograph available.





Photograph No.: 1-11  
Direction: W/Down

Time: 1337  
Date: July 12, 2000

Description: View of sample being collected at grid location D-5 in the 84" Strip Mill.





Photograph No.: 2-1  
Direction: SW

Time: 1107  
Date: July 11, 2000

Description: View of SWMU 45, the Waste Sodium Dichromate Loading Station. Note that the blue staining visible during the VSI is no longer present.





Photograph No.: 2-2  
Direction: SE

Time: 1112  
Date: July 11, 2000

Description: View of SWMU 45, the Waste Sodium Dichromate Loading Station. Note the straight lines in the gravel, which appears freshly scraped. Blue staining is not apparent.





Photograph No.: 2-3  
Direction: SW

Time: 1125  
Date: July 11, 2000

Description: Photograph of the collection of soil sample S16 at SWMU 45.





Photograph No.: 2-4  
Direction: SW

Time: 1130  
Date: July 11, 2000

Description: Collection of sample number S16. Note that the sample is a composite collected from four locations, each approximately 1 to 3 feet apart, along the southeast side of the loading station.





Photograph No.: 2-5  
Direction: NE

Time: 1153  
Date: July 11, 2000

Description: Collection of sample number S17 at SWMU 45.





Photograph No.: 2-6  
Direction: S

Time: 1201  
Date: July 11, 2000

Description: Collection of sample number S18 at SWMU 45. The sample is a composite from four locations, each approximately 1 to 3 feet apart, from along the southwest edge of the loading station.





Photograph No.: 2-7  
Direction: NE

Time: 1213  
Date: July 11, 2000

Description: Collection of sample number S19 at SWMU 45. The sample is a composite collected from four locations, each approximately 1 to 3 feet apart, from along the northwest edge of the loading station.





Photograph No.: 2-8  
Direction: NW

Time: 1219  
Date: July 11, 2000

Description: Photograph of the equipment decontamination after sampling at SWMU 45.





Photograph No.: 2-9  
Direction: NNE

Time: 1237  
Date: July 11, 2000

Description: View of the chromic acid waste tank at SWMU 50. Note that the steel tank immediately in front of the concrete pad covers the ground area adjacent to the concrete. Also note the staining on the side of the building in the photo.





Photograph No.: 2-10

Direction: SE

Time: 1241

Date: July 11, 2000

Description: View of the steel tank and concrete pad at SWMU 50.





Photograph No.: 2-11  
Direction: NW

Time: 1250  
Date: July 11, 2000

Description: Collection of sample number S20 at SWMU 50. The sample is a composite collected from five areas, approximately 3-4 feet apart, from along the west and northwest edge of the paved area surrounding the chromic acid tank.





Photograph No.: 2-12  
Direction: E

Time: 1252  
Date: July 11, 2000

Description: View of sample S21 being composited at SWMU 50. The sample was collected from along the northeast edge of the chromic acid tank area.





Photograph No.: 2-13  
Direction: NNE

Time: 1257  
Date: July 11, 2000

Description: View of standing water beneath the chromic acid tank at SWMU 50. The water is clear, with no visible sheen. Note the green-colored substance on the concrete beneath the water. According to Mr. Al Cross, this standing water is rainwater, and the green substance is moss. The drain visible in the right corner of the photograph is reportedly a sump used to pump water from this area into the facility process waste water.





Photograph No.: 2-14  
Direction: S

Time: 1258  
Date: July 11, 2000

Description: Collection of sample number S22 at SWMU 50. The sample was collected from along the southwest edge of the chromic acid tank area.





Photograph No.: 2-15  
Direction: SE

Time: 1300  
Date: July 11, 2000

Description: Collection of sample number S23 at SWMU 50. The sample was collected from along the southeast edge of the chromic acid tank area.





Photograph No.: 2-16  
Direction: NNW

Time: 1322  
Date: July 11, 2000

Description: View of the entire waste chromic acid tank area at SWMU 50. The tank containing waste chromic acid is elevated.





Photograph No.: 2-17  
Direction: E

Time: 1500  
Date: July 11, 2000

Description: View of the rolloff box at the Ladle Metallurgy Facility Baghouse (SWMU 11) that contains cadmium dust. Note the conveyor system entering the top of the rolloff box.





Photograph No.: 2-18  
Direction: E

Time: 1501  
Date: July 11, 2000

Description: View of the area underneath the Ladle Metallurgy Facility Baghouse (SWMU 11). LTV is in the process of constructing a concrete pad under the LMF; this is the area that can be seen covered with plastic sheeting.





Photograph No.: 2-19  
Direction: SW/Down

Time: 1536  
Date: July 11, 2000

Description: View of the area swept for sample number S24 at SWMU 11. The sample was collected from the east side of the LMF.





Photograph No.: 2-20  
Direction: SE/Down

Time: 1538  
Date: July 11, 2000

Description: View of the area swept for sample number S25 at the LMF (SWMU 11). The sample was collected from the area under and around the rolloff box.





Photograph No.: 2-21  
Direction: SW/Down

Time: 1539  
Date: July 11, 2000

Description: View of the area swept for sample number S27 at SWMU 11. The sample was collected from along the north side of the LMF.





Photograph No.: 2-22  
Direction: NW/Down

Time: 1540  
Date: July 11, 2000

Description: View of the area swept for sample number S26 (SWMU 11). The sample was collected from underneath the rolloff box, and the area between the rolloff box and the LMF.





Photograph No.: 2-23  
Direction: SE

Time: 1542  
Date: July 11, 2000

Description: Decontamination of sampling equipment after the completion of sample collection at the Ladle Metallurgy Facility Baghouse, SWMU 11.





Photograph No.: 2-24  
Direction: E

Time: 1607  
Date: July 11, 2000

Description: View of SWMUs 28 and 29, the No. 3 Sheet Mill Spent Pickle Liquor Tanks. Note the red staining on the concrete stand and the concrete pad in front of the tanks.





Photograph No.: 2-25  
Direction: NNE

Time: 1618  
Date: July 11, 2000

Description: Collection of sample number S28 at SWMUs 28 and 29. Note the reddish staining just below the surface of the soil.





Photograph No.: 2-26  
Direction: NNE

Time: 1621  
Date: July 11, 2000

Description: Collection of sample number S29 at SWMUs 28 and 29. Note the reddish-orange stains on the concrete pad and the reddish-orange color of the small puddle of standing water.





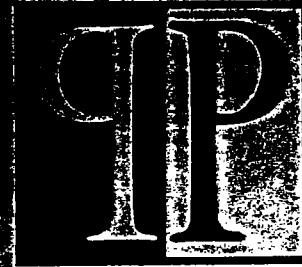
Photograph No.: 2-27  
Direction: NNE

Time: 1636  
Date: July 11, 2000

Description: Collection of sample S30 at SWMUs 28 and 29. The soil in this area is significantly more stained (orange-red in color) than soil 5 feet further from the tanks.

**APPENDIX C**

**LTV STEELINC, FIELD LOGBOOK**



# JOB BOOK

FROM PENINSULAR PUBLISHING

PROJECT NAME

LTV

PROJECT NUMBER

CREW

Todd Quillen / Kristi Pawski

DATE

7/11/00

BOOK #

1 OF 1

WEATHER

77° humid overcast

FIELD BOOK

16 PAGE

8 LEAVES

50% RAG



# CURVE FORMULAS

$$T = R \tan \frac{1}{2} I$$

$$T = \frac{50 \tan \frac{1}{2} I}{\sin \frac{1}{2} D}$$

$$\sin \frac{1}{2} D = \frac{50}{R}$$

$$R = T \cot \frac{1}{2} I$$

$$R = \frac{50}{\sin \frac{1}{2} D}$$

$$\text{Chord def.} = \frac{\text{chord}^2}{R}$$

$$\text{No. chords} = \frac{I}{D}$$

Sin.  
T  
the di  
T  
R  
and di  
R  
the gi  
T  
by .01

**PARAMOUNT**

ENVIRONMENTAL  
SERVICES

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**Richard E. Schmidt, P.E., CHMM**  
PRESIDENT

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7149 E. 46th St.  
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RESchmidt@aol.com

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featuring Geoprobe® equipment

Given Base 100, Alt.  $10.10^2 + 200 = .5$ ,  $100 + .5 = 100.5$  hyp.

Given Hyp. 100, Alt.  $25.25^2 + 200 = 3.125$ ,  $100 - 3.125 = 96.875 = \text{Base}$ .

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

**LEVELING.** The correction for curvature and refraction, in feet and decimals of feet is equal to  $0.574 d^2$ , where  $d$  is the distance in miles. The correction for curvature alone is closely,  $\frac{1}{2} d^2$ . The combined correction is negative.

**PROBABLE ERROR.** If  $d_1, d_2, d_3$ , etc. are the discrepancies of various results from the mean, and if  $\sum d^2$  the sum of the squares of these differences and  $n$  the number of observations, then the probable error of the mean =  $\pm 0.6745 \sqrt{\frac{\sum d^2}{n(n-1)}}$

## MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

## INCHES IN DECIMALS OF A FOOT

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0625	.03125	.015625	.015625	.03125	.046875	.078125	.125	.15625	.21875	.28125
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

①

7/11/00

Arrived at Tin Mill Guard Shack at 0900

Met Drillers Dan Gunnum and Ed DeLuca.

IDEM Mike was There too.

Guard brought us to Al Cross' office

The Engineers who will help us locate

The utilities stopped by The Meeting

1005 left meeting for Field

Arrived at Coke Processing area

We all arrived at site Then

took out GW sampling Equipment

and Terry, Demaree, and Kristi took

car with Al and others to visit

SWMUS

Amy Lawrence from ADL was

going to oversee the GW sampling.

We stored Bottleware in her

locked car while I walked

The site with Mike Sickles (IDEM)

Kieth Nay (LTV Engineer-utilities/coke operation)

Dick Rupnow (LTV Eng) and Kieth Nagel

(LTV Cincinnati corporate) and Amy.

TR



Photo	View	Time	Desc	7/11/00
1-1	SW	1235	On Location at S-01	
1-2	SW	1322	S-02	
1-3	<del>SW</del> 7/11/00 down	1457	Screen at S03 showing ring of potential product and apparent product smearing	
1-4	W	1458	S03 from a distance	
1-5	NW	1525	Collecting water sample at S04	
1-6	N	1550	Sampling at S05 w/ mill in background	

③ 7/11/00

Mike was generally familiar with a Trucker's Map that was handed out at a pre sampling meeting several weeks/months ago.

He said much of the Tank storage of Coke process were store along west fence line. We walked the site down to Canal and marked 2 areas for sampling. We came back to west fence and marked 4 more spots. TO identified and marked all spots. The LTV Engineers told me they would let me know where the 2 tanks were that handled the coke process ~~water~~ <sup>3/11/00</sup> decanting.

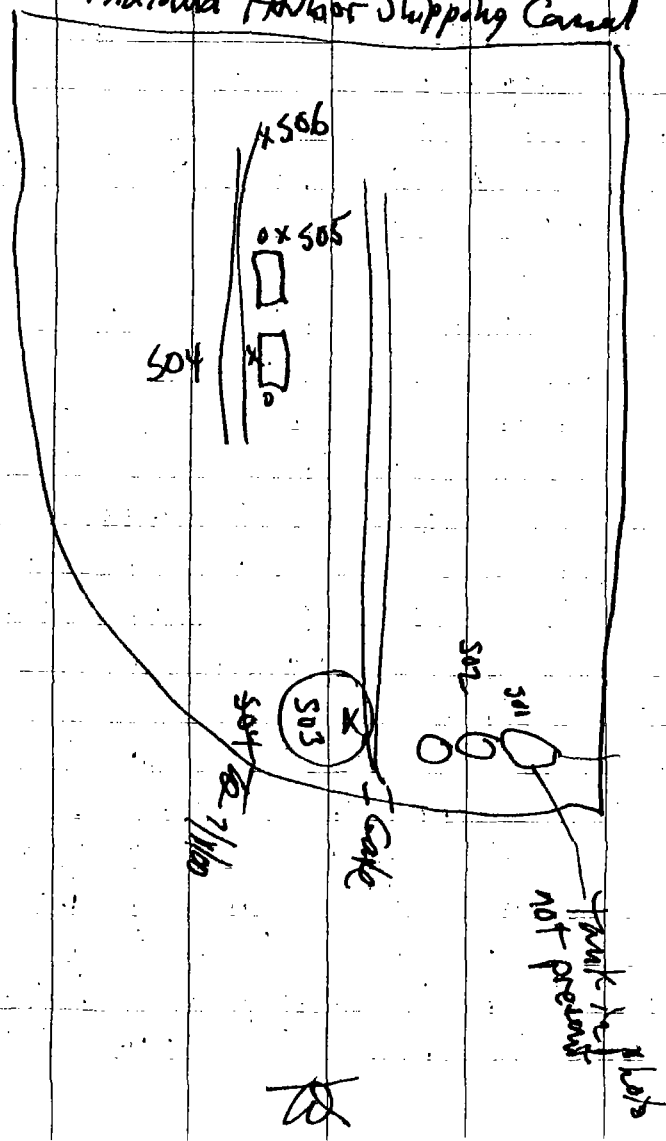
12:00 waiting at site with drillers. Amy, Mike, Keith went to get drinks for themselves. I stayed w/ sampling Eg at site. The engineers will check preliminarily the sites we marked and let us know if we can start drilling. The Survey crew will come out.

④

7/11/00

Island Steel

Indiana Harbor Shipping Canal



⑤

7/11/00

around 12:50 ~~7/11/00~~ 1230 or 1300  
to precisely determine drill locations  
to make sure there are no  
utilities.

Keith Nay returned and gave us  
the OK at 12:30 within 45 minutes  
of checking for S-01  
1235 started drilling  
1240 done drilling prepped for  
sampling

Water level 5.5 feet BGS according  
to Driller's interface probe. Measurement  
is approximate

Sample time 1250  
Driller's deamed w/ 3 buckets &  
Alcamox. Decon operation looked good.  
Boring abandoned w/ bentonite chips

1320 on location at S02  
10' of stem pushed into ground  
15 slot screen used

Similar to S01, S02 was black  
when it started pumping and cleared  
up after a while.

Sample Time 1335

⑥



⑦

7/11/00

Rinsate blank collected  
at 1350 after decanning SO2  
before SO3. Called RO3  
Water poured through inside of  
decanned bottom piece of stem.  
1400-1420 walked around and located  
~~14~~ ~~7/11/00~~ SO4, SO5, and SO6  
1420 at location at SO3  
near maintenance shed and offices  
1<sup>st</sup> 2 tries hit Foundation  
Location 60' from end of center  
Road in a line with North side of  
3<sup>rd</sup> try Foundation again  
4<sup>th</sup> Foundation again  
Moved 40 feet South  
Sample time SO3 1445

On location SO4 at 1505 Hit Foundation near  
SO4 115' South East of  
building near end of  
utility bridge, 40' from center  
of "North" decanter, 30 South  
of road  
Water Level 5.5 feet Pump intake  
at 8 feet at bottom of screen

to

to

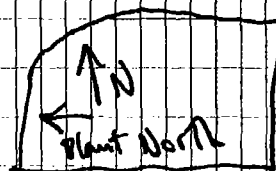
⑧

⑨

7/11/00

Sample Time For S04 is  
1520

1545 on location at south side  
of "South" decanter



1555 Sample Time for S05  
Duplicate D05 collected at  
D05

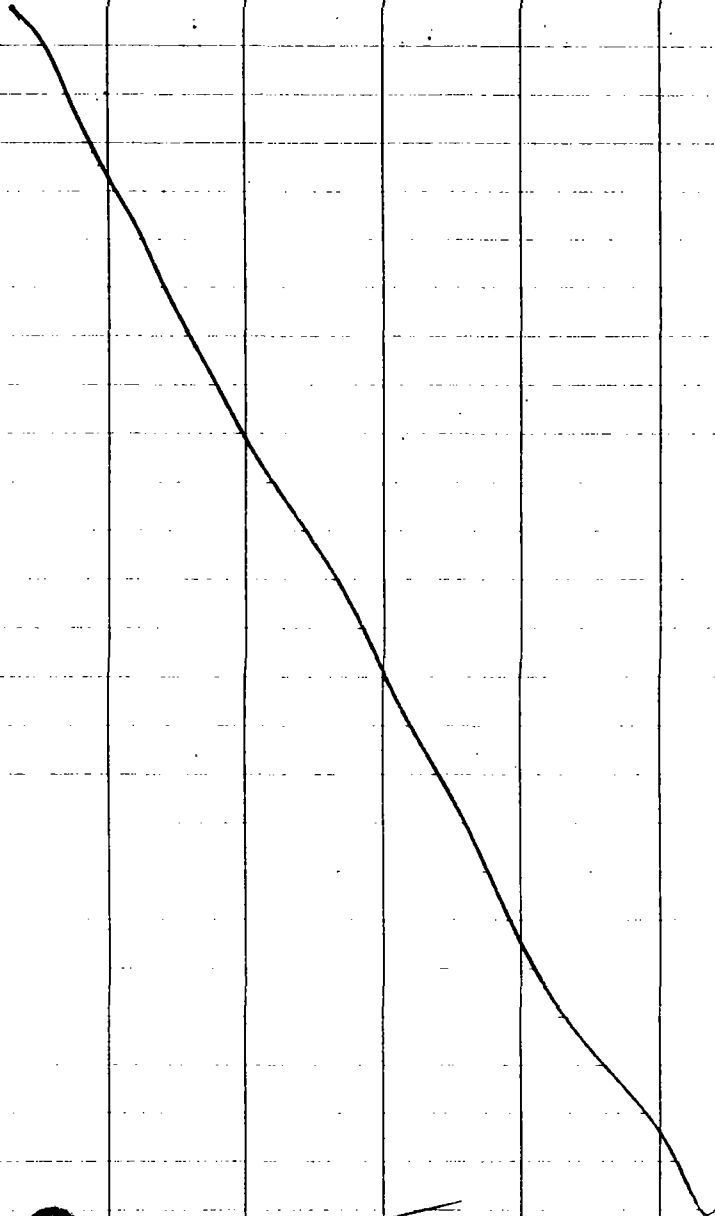
1635 on location at S06  
200' from canal, in line w/ Inland building  
between 2 roads, near  
old ammonia operation  
Sample Time 1650  
Water level 6' Tube set at 8'

to

to



⑥

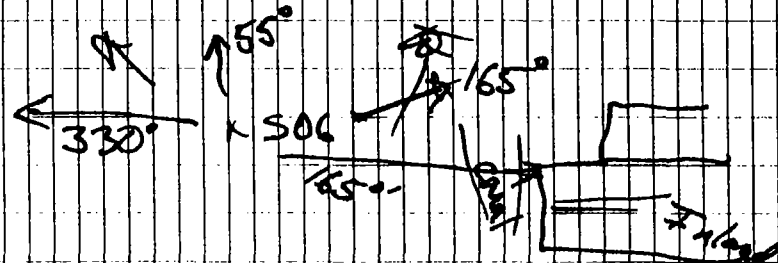


62

stack at LTV

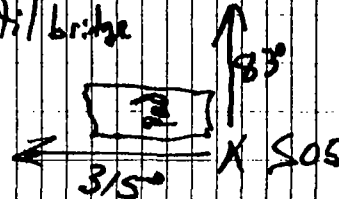
7/11/00

Utility Bridge



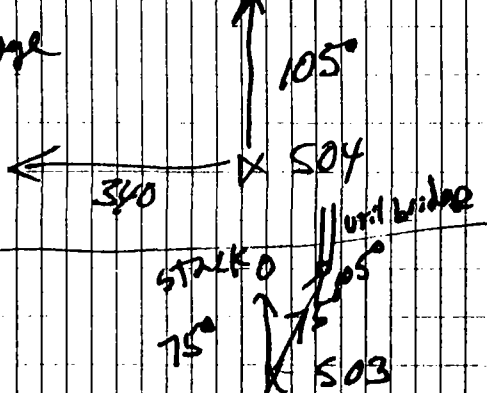
Utility bridge

stack at LTV



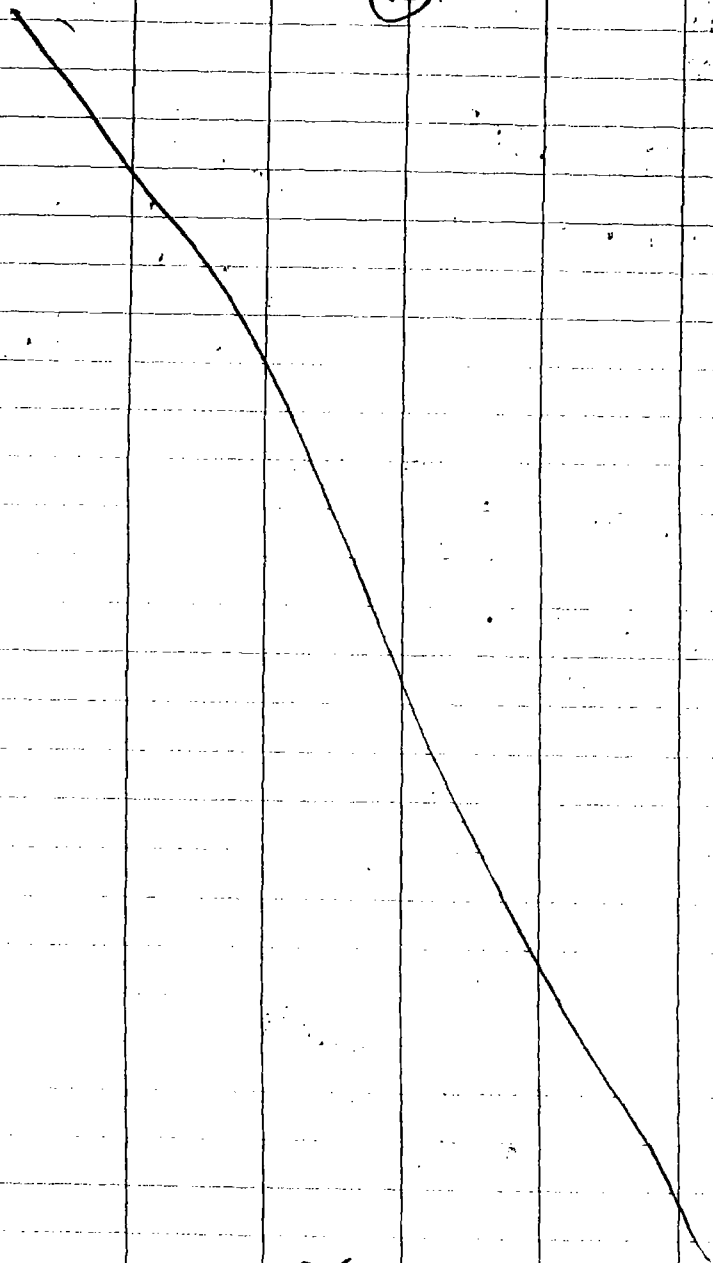
Bridge

Stack



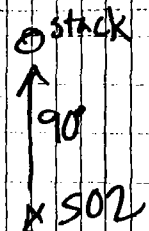
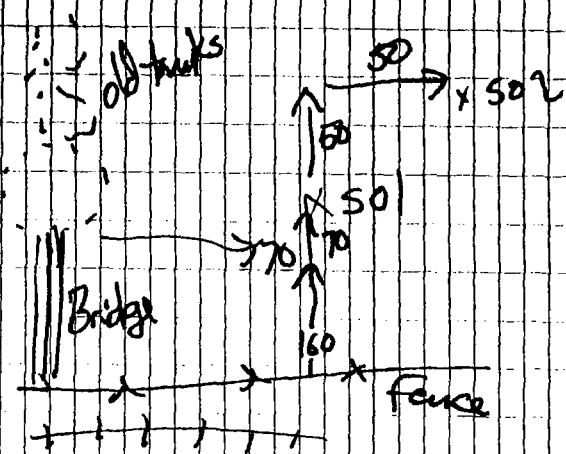
72

(12)



to

(13)



1730 left side

PPE Level D  
Paperwork at office until 2000

End of Log

to



# JOB BOOK

FROM PENINSULAR PUBLISHING

PROJECT NAME ETA

PROJECT NUMBER EDS 7051

CREATED BY DAVID L. TRUETT / R. PAUL

DATE 1/1/00 BOOK # 1 OF 1

WEATHER

FIELD BOOK  
4 PAGE  
8 LEAVES  
50% RAG

# CURVE FORMULAS

$$\begin{aligned} R &= T \tan \frac{1}{2} I \\ T &= \frac{50 \tan \frac{1}{2} I}{\sin \frac{1}{2} D} \\ \sin \frac{1}{2} D &= \frac{50}{R} \\ \sin \frac{1}{2} D &= \frac{50 \tan \frac{1}{2} I}{T} \end{aligned} \quad \begin{aligned} R &= T \cot \frac{1}{2} I \\ R &= \frac{50}{\sin \frac{1}{2} D} \\ E &= R \text{ ex. sec } \frac{1}{2} I \\ E &= T \tan \frac{1}{2} I \end{aligned} \quad \begin{aligned} \text{Chord def.} &= \frac{\text{chord}^2}{R} \\ \text{No. chords} &= \frac{I}{D} \\ \text{Tan. def.} &= \frac{1}{2} \text{ chord def.} \end{aligned}$$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

## GENERAL DATA

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10.  $10^2 \div 200 = .5$ .  $100 + .5 = 100.5$  hyp.

Given Hyp. 100, Alt.  $25.25^2 \div 200 = 3.125$ .  $100 - 3.125 = 96.875 = \text{Base}$ .

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to  $0.574 d^2$ , where  $d$  is the distance in miles. The correction for curvature alone is closely,  $\frac{1}{2} d^2$ . The combined correction is negative.

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$$\pm 0.6745 \sqrt{\frac{\sum d^2}{n(n-1)}}$$

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9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

## INCHES IN DECIMALS OF A FOOT

1-16	3-32	1/4	3-16	1/2	5-16	3/4	11/16	3/4	1	11/8	1 1/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729	.0833
1	2	3	4	5	6	7	8	9	10	11	12
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.0000

DATE: 7/11/00

900 - Arrived at the site

930 - met w/ Al Cross & Mr. Nagel of LTV in conference room to discuss the sampling.

set up sampling schedule

→ Engineers to go to Coke Plant (swamp 60) to ID lines - may take a day will try to help identify old Decanter Pits.

TEAM 1

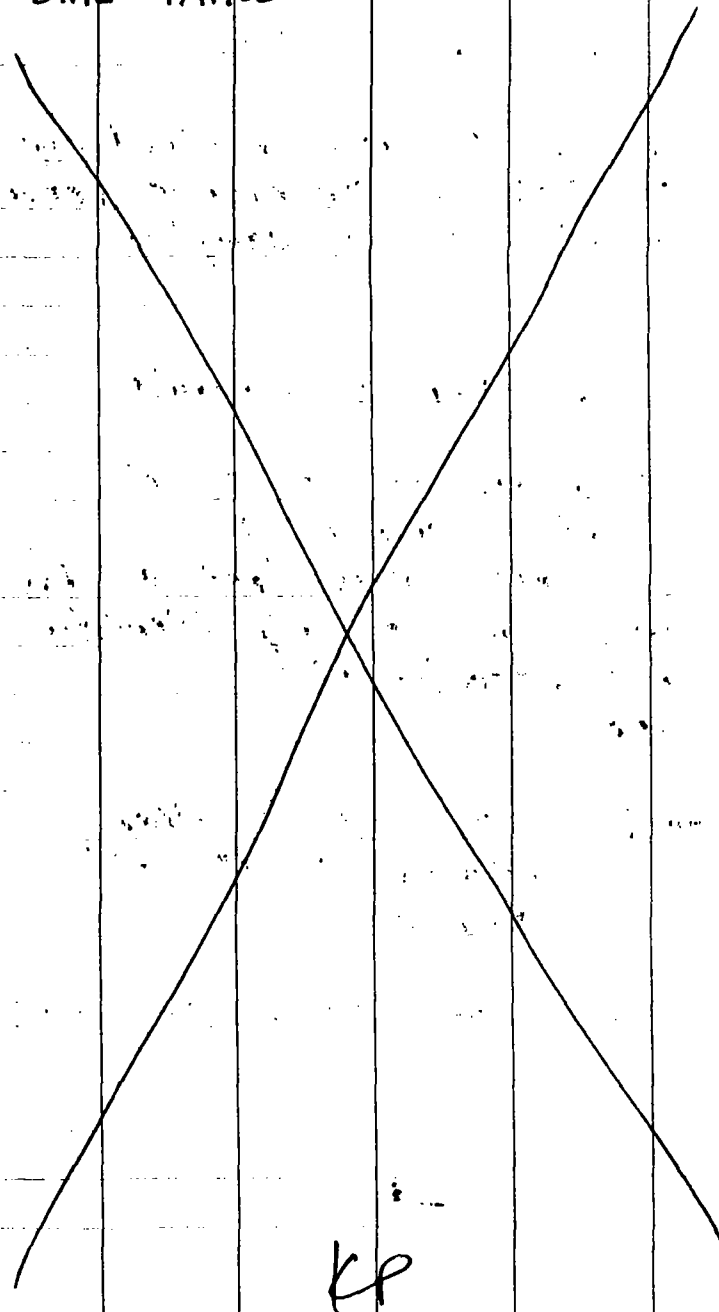
Team 2 - will go to other swamps to do soil sampling.

WEATHER IS SUNNY WITH A SLIGHT WIND.

kp



② DATE: 7/11/00



KP

DATE: 7/11/00

③

10:30  
met at swmu 65.  
Discussed groundwater  
sampling locations  
and unloaded  
groundwater sampling  
supplies.

10:53  
T. Necker, D. Collier,  
K. Pawski, Al Cross  
and LTV Contractors  
drove to swmu 45.

10:58  
Set up to sample.

Photo #1 7/11/00 PHOTOGRAPHER: K.  
TIME: 11:07 DIRECTION: SW PAWSKI  
7/11/00 KP SWMU 45 WASTE SODIUM  
DICHROMATE LOADING STATION  
NOTE: BLUE STAINING PRESENT  
DURING VSI IS NOT PRESENT.

KP

④

DATE: 7/11/00

KP

DATE: 7/11/00

⑤

PHOTO #2 7/11/00 TIME: 11:12 DIRECTION: SE  
WASTE SODIUM DICHROMATE LOADING STATION  
PHOTOGRAPHER: K. PAWSKI  
NOTE: GRAVEL APPEARS TO BE FRESHLY  
SCRAPED. NOTE THE STRAIGHT LINES  
IN THE GRAVEL. NO APPARENT BLUE  
STAINING.

TIME:  
11:17

SET UP DECON. AREA.

DECONTAMINATED BUCKET TO BE USED FOR  
EQUIPMENT DECONTAMINATION.

TIME: 11:23

DISCUSSED LOCATION OF SAMPLE LOCATIONS  
FOR SWMU 45.

PHOTO #3  
7/11/00

TIME: 11:25

DIRECTION: SW

WASTE SODIUM DICHROMATE LOADING STATION  
PHOTOGRAPHER K. PAWSKI

NOTE: COLLECTION OF SOIL SAMPLE AT  
SWMU 45.

KP

⑥

DATE: 7/11/00

KP

DATE: 7/11/00

⑦

TIME: 11:25 LOCATION: WASTE SODIUM DICHROMATE  
LOADING STATION  
BEGAN SAMPLING AT SWMU 45.

COLLECTED COMPOSITE FOR SAMPLE NUMBER  
2000RC02S16. TOOK COMPOSITE FROM  
FOUR LOCATIONS, EACH APPROX. 1 FT.  
APART, ALONG SE. SIDE OF LOADING STATION.

PHOTO #4

TIME: 11:30

7/11/00

DIRECTION: SW

PHOTOGRAPHER: K. PAWSKI

SWMU 45 - WASTE SODIUM DICHROMATE  
LOADING STATION

NOTE: COLLECTION OF COMPOSITE SAMPLE  
NUMBER 2000RC02S16.

TIME: 11:37 LOCATION: WASTE SODIUM DICHROMATE  
LOADING STATION  
SPLIT SAMPLE NUMBER 2000RC02S16  
WITH LTV CONTRACTOR

TIME: 11:43 LOCATION: WASTE SODIUM DICHROMATE  
LOADING STATION

COLLECTED DUPLICATE SAMPLE NUMBER  
2000RC02D16. SPLIT SAMPLE WITH LTV  
CONTRACTOR.

KP

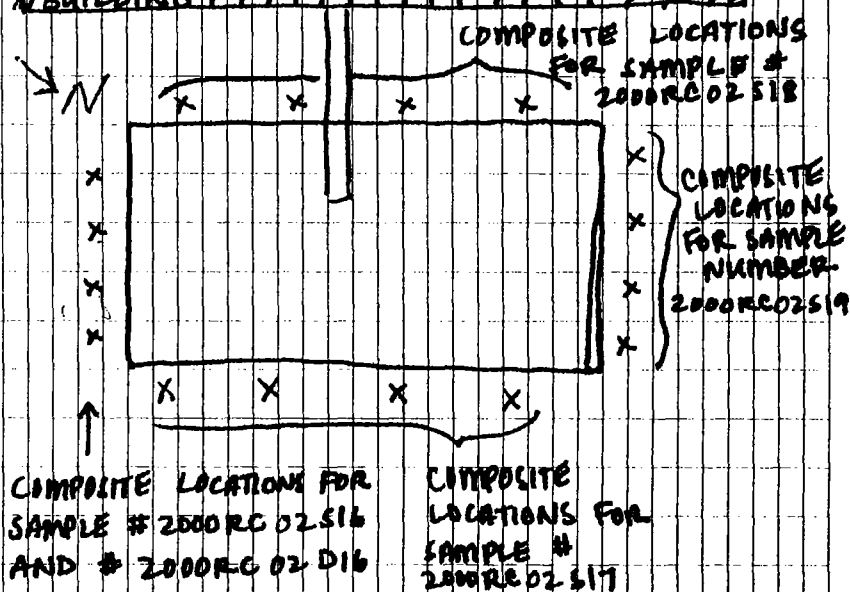
8

DATE: 7/11/00

DATE: 7/11/00

9

DESCRIPTION: LOCATION OF COMPOSITE SAMPLE  
LOCATIONS FOR SAMPLES AT SWMU 45  
WASTE SODIUM DICHROMATE LOADING STATION  
BUILDING



TIME: 11:48

LOCATION: SWMU 45

BEGAN SAMPLE COLLECTION FOR SAMPLE  
NUMBER 2000RC02517

SAMPLE COMPOSITES COLLECTED ALONG NE  
EDGE OF LOADING STATION. SAMP  
COMPOSITED FROM FOUR (4) LOCATIONS, EACH  
APPROXIMATELY 2-3 FT. APART.

KP

KP



(10)

DATE: 7/11/00

KP

DATE: 7/11/00

(11)

PHOTO #5

7/11/00

WASTE SODIUM DICHROMATE LOADING STATION

TIME: 11:53 DIRECTION: NE

LOCATION: SWMU 45

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE NUMBER  
2000RC02S17.

TIME: 12:00

LOCATION: SWMU 45

BEGAN COLLECTION OF SAMPLE NUMBER  
2000RC02S18 FROM SW EDGE OF  
LOADING STATION.

PHOTO #6

7/11/00

LOCATION: SWMU 45

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE #2000RC02S18  
FROM SW EDGE OF LOADING STATION.

TIME: 12:01

DIRECTION: S

TIME: 12:08

LOCATION: SWMU 45

BEGAN COLLECTION OF SAMPLE NUMBER  
2000RC02S19

KP

DATE: 7/11/00

DATE: 7/11/00

13

PHOTO #7  
7/11/00

TIME: 12:13  
DIRECTION: NE

LOCATION: SWMU 45

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE NUMBER  
2000RC02 SW FROM NW EDGE OF  
LOADING STATION.

PHOTO #8  
7/11/00

TIME: 12:19  
DIRECTION: NW

LOCATION: SWMU 45

PHOTOGRAPHER: K. PAWSKI

NOTE: EQUIPMENT DECONTAMINATION AFTER  
SAMPLING AT SWMU 45.

TIME: 12:35

ARRIVED AT SWMU 50, NO. 2 TIN MILL WASTE <sup>CHEMICAL</sup> ACID TANK

NOTE: TANK IMMEDIATELY SW OF CONCRETE COVERS  
MOST OF THE ADJACENT GROUND.

PHOTO #9  
7/11/00

TIME: 12:37  
DIRECTION: NNE

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: TANK IMMEDIATELY SW OF CONCRETE  
PAD COVERS GROUND AREA ADJACENT TO  
CONCRETE.

KP

KP

(14)

DATE: 7/11/00

DATE: 7/11/00

(15)

PHOTO #10

TIME: 12:41

7/11/00

DIRECTION: SE

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: TANK AND CONCRETE PAD  
AT SWMU 50

TIME: 12:44

LOCATION: SWMU 50

WATER HAS ACCUMULATED ON THE GROUND UNDER  
THE CHROMIC ACID TANK. WATER APPEARS CLEAR, WITH  
NO VISIBLE SHEEN. A LARGE GRATE IS PRESENT  
APPROX. 3 INCHES UNDER WATER LEVEL, BUT  
DOES NOT APPEAR TO BE DRAINING THE WATER.

TIME: 12:43

LOCATION: SWMU 50

SAMPLE # 2000RC02S20  
BEGAN SAMPLE COLLECTION.

TIME: 12:48

LOCATION: SWMU 50

SAMPLE # 2000RC02S21  
BEGAN SAMPLE COLLECTION.

KP

KP

DATE: 7/11/00

DATE: 7/11/00

PHOTO #11

TIME: 12:50

DATE: 7/11/00

DIRECTION: NW

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE #

2000RC02S20 A COMPOSITE OF FIVE(5)  
SAMPLES FROM W AND NW EDGE OF  
CHROMIC ACID TANK AREA. SAMPLES ARE  
APPROX. 34 FT. APART

PHOTO #12

TIME: 12:52

DATE: 7/11/00

DIRECTION: E

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: COMPOSITING SAMPLE # 2000RC02 S21  
FROM ALONG SE EDGE OF CHROMIC ACID TANK AREA.  
SAMPLES ARE APPROX. 2-3 FT. APART.  
ALL SAMPLES IN THIS AREA ARE COLLECTED  
FROM 1-3 INCHES IN DEPTH. PACKED GRAVEL  
AND SLAG MADE COLLECTION OF DEEPER  
SAMPLES DIFFICULT.

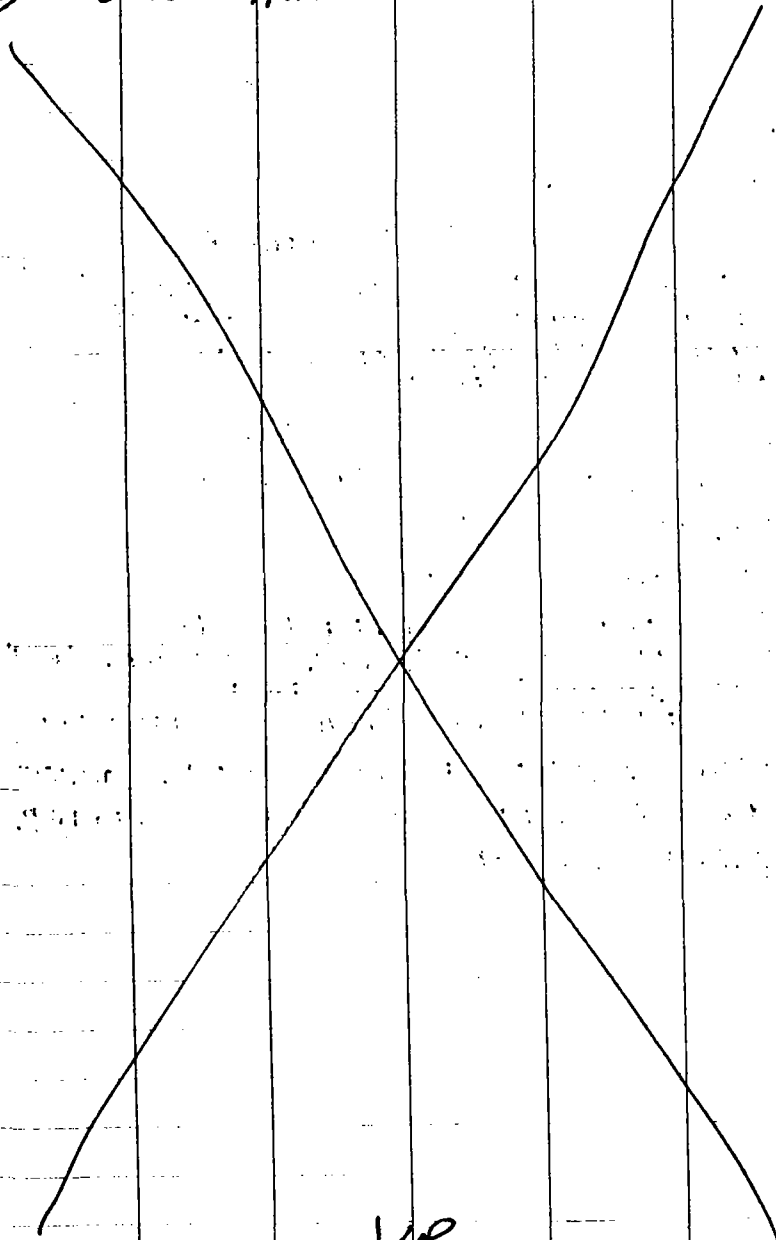
KP

KP



(18)

DATE: 7/11/00



KP

DATE: 7/11/00

(19)

PHOTO #13

TIME: 12:57

DATE: 7/11/00

DIRECTION: NNE

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTED (RAIN)WATER IS CLEAR,  
WITH NO VISIBLE SHEEN. NOTE GREEN COLORED  
SUBSTANCE ON CONCRETE BENEATH WATER.

TIME: 13:00

ACCORDING TO AL CROSS (LTV) WATER UNDER  
CHROMIC ACID TANK IS RAINWATER.

THE GRATE ON THE S END OF THE COLLECTED  
WATER IS A SUMP USED TO PUMP WATER  
COLLECTED IN THIS AREA. THE PUMPED  
WATER IS ADDED TO FACILITY PROCESS  
WATER. GREEN SUBSTANCE BENEATH  
WATER SAID TO BE MOSS (AL CROSS).

PHOTO #14

TIME: 12:58

DATE: 7/11/00

DIRECTION: S

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE #2000RC02522  
COMPOSITE OF FIVE(5) SAMPLES  
COLLECTED FROM ALONG THE SW EDGE OF  
THE CHROMIC ACID TANK AREA.  
SAMPLES ARE APPROX. 2-3 FT. APART.

KP

(20)

DATE: 7/11/00

DATE: 7/11/00

(21)

PHOTO #15

TIME: 13:00

DATE: 7/11/00

DIRECTION: SE

LOCATION: SWMU 50

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE # 2000RC02 S23  
FROM ALONG CG EDGE OF CHROMIC ACID TANK  
AREA. COMPOSITE OF FOUR (4) SAMPLES.

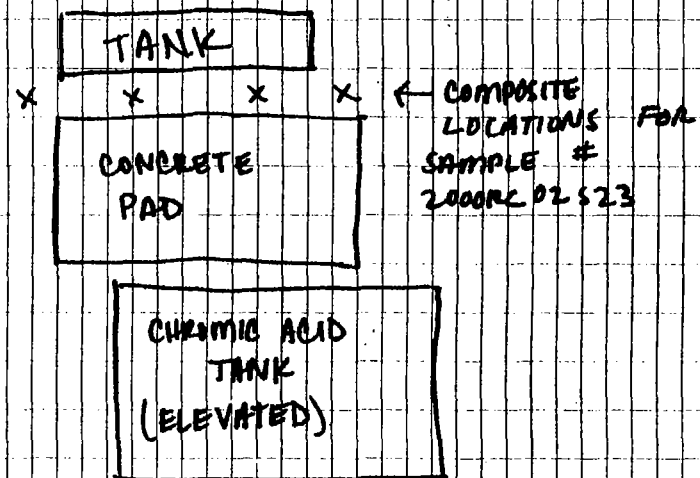
~~PHOTO #16~~~~TIME: 7/11/00~~  
KP

PHOTO #16

TIME: 1322

DATE: 7/11/00

DIRECTION: NNW

LOCATION: SWMU 50

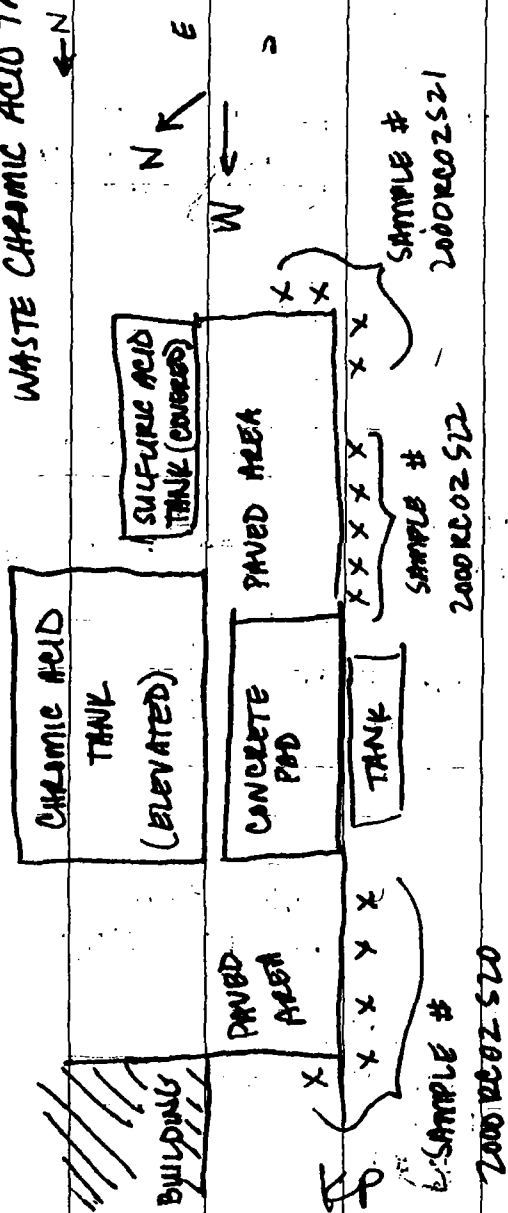
PHOTOGRAPHER: K. PAWSKI

NOTE: VIEW OF ENTIRE SWMU 50  
SAMPLING AREA.

KP

SWMU 50: NO. 2 TIN MILL  
WASTE CHROMIC ACID TANK

DATE: 7/11/00



DATE: 7/11/00

(23)

TIME: 1325

LOCATION: SWMU 50  
WHEN ALCONOX AND DI WATER FROM EQUIPMENT  
DECON WERE POURED INTO THE GRATE, SAID  
TO BE A SUMP, UNDER THE CHROMIC ACID TANK,  
THE WATER TURNED GREEN AND BEGAN  
TO BUBBLE.

TIME: 1330

LEFT SWMU 50 AND DROVE TO  
SWMU 65, COKE PLANT.

TIME: 1335

ARRIVED AT SWMU 65, COKE PLANT.  
BROKE FOR LUNCH.

TIME: 1450

RECONVENED AND DROVE TO SWMU 11

LTV IS IN THE PROCESS OF INSTALLING A  
PAD UNDERNEATH THE LMF THIS AREA IS  
CURRENTLY COVERED WITH THICK PLASTIC  
SHEETS. A ROLL-OFF BOX IS LOCATED

DIRECTLY ADJACENT TO THE LMF TO THE NW.  
THE ROLL-OFF IS USED TO COLLECT CADMIUM DUST.  
THE ROLL-OFF IS COVERED. ACCORDING TO  
AL CROSS (LTV) THE BOX IS ALWAYS COVERED.

KP.

(24) DATE: 7/11/00  
CADMIUM DUST ENTERS THE ROLL-OFF  
THROUGH A CONTAINED CONVEYOR. NO DUST WAS  
OBSERVED ESCAPING TO THE ENVIRONMENT.

PHOTO #17

TIME: 1500

DATE 7/11/00

DIRECTION: E

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: ROLL-OFF BOX CONTAINING CADMIUM  
DUST.

PHOTO #18

TIME: 1501

DATE 7/11/00

DIRECTION: E

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: ROLL-OFF BOX AND AREA BENEATH LMF.

TIME: 1505

LOCATION: LMF

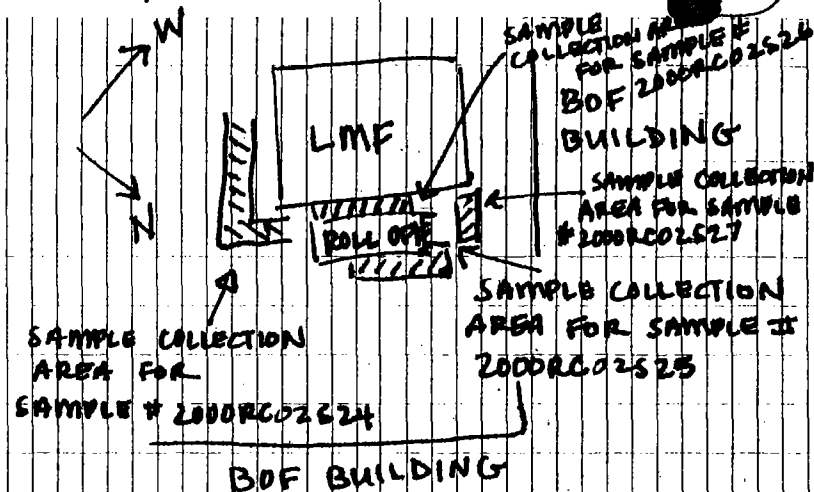
BEGAN COLLECTION OF SAMPLE #2000RC02524.

THE SAMPLE WAS COLLECTED FROM THE NE  
AND SE SIDES OF THE LMF. DUE TO THE  
SHALLOW DEPTH OF SOIL IN THIS AREA, THE

SAMPLE WAS COLLECTED BY SWEEPING AN AREA  
1-2 FT. WIDE WITH A PLASTIC SPOON. THE  
COLLECTED MATERIAL WAS COMPOSITED IN A PLASTIC  
BOWL.

KP

DATE: 7/11/00



TIME: 1505

LOCATION: LMF

BEGAN COLLECTION OF SAMPLE #2000RC02525.  
THE SAMPLE WAS COLLECTED FROM THE AREA  
UNDER AND AROUND THE ROLL-OFF BOX.  
DUE TO THE SHALLOW DEPTH OF SOIL, THE  
SAMPLE WAS COLLECTED BY SWEEPING AN  
AREA APPROXIMATELY 3 FT. BY 15 FT.  
WITH A SPOON. THE COLLECTED MATERIAL  
WAS THEN COMPOSITED IN A PLASTIC BOWL.

TIME: 1520-1525

LOCATION: LMF

BEGAN COLLECTION OF SAMPLE # 2000RC02527.  
THE SAMPLE WAS COLLECTED FROM THE AREA  
NE AND NW OF THE LMF. THE SAMPLE WAS  
COLLECTED BY SWEEPING AN AREA 2 FT. BY 6 FT. WIDE  
WITH A PLASTIC SPOON. THE COLLECTED MATERIAL  
WAS THEN COMPOSITED IN A PLASTIC BOWL. KP



(26)

DATE: 7/11/00

TIME: 1525

LOCATION: LMF

BEGAN COLLECTING SAMPLE # 2000RC02-S27-S26  
THE SAMPLE WAS COLLECTED FROM A 2FT. BY 15FT.  
AREA UNDER AND AROUND THE ROLL-OFF BOX WITH  
A PLASTIC SPOON.

DURING SAMPLING, IT WAS OBSERVED THAT  
SOIL DEEPER THAN 1/4 INCH HAD A YELLOW-  
COLORED TINGE THAT WAS SIGNIFICANTLY  
DIFFERENT THAN THE UPPERMOST 1/4 INCH  
OF SOIL.

AFTER THE SOIL WAS COLLECTED IN A  
PLASTIC BOWL, IT WAS COMPOSITED BEFORE  
BEING PUT INTO SAMPLE JARS.

ALL SAMPLES WERE SPLIT WITH THE LTV  
CONTRACTOR (S24, S25, S26, S27) AFTER  
BEING COMPOSITED.

TIME: 1535

LOCATION: LMF

SAMPLING IN THIS LOCATION WAS COMPLETED  
AND SAMPLING EQUIPMENT WAS DECONNED.

SOIL IN THE AREA SURROUNDING THE LMF  
CONTAINED "SHINY" PIECES, THE SIZE OF A GRAIN OF  
SAND. ACCORDING TO AL CROSS (LTV), THESE ARE  
SMALL PIECES OF METAL THAT ESCAPE FROM  
CERTAIN OPERATIONAL AREAS OF THE FACILITY. KP

DATE: 7/11/00

(27)

PHOTO #19

DATE: 7/11/00

LOCATION: LMF

<sup>7/11/00</sup>  
KP LMF PHOTOGRAPHER: K. PAWSKI

NOTE: AREA SWEEP FOR SAMPLE #2000RC02-S24

TIME: 1536

DIRECTION: SW

PHOTO #20

DATE: 7/11/00

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: AREA SWEEP FOR SAMPLE #2000RC02-S25

TIME: 1538

DIRECTION: SE

PHOTO #21

DATE: 7/11/00

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: AREA SWEEP FOR SAMPLE #2000RC02-S27

TIME: 1539

DIRECTION: SW

PHOTO #22

DATE: 7/11/00

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: AREA SWEEP FOR SAMPLE #2000RC02-S26

TIME: 1540

DIRECTION: NW

KP

(28)

DATE: 7/11/00

PHOTO # 23

TIME: 1542

DATE: 7/11/00

DIRECTION: SE

LOCATION: LMF

PHOTOGRAPHER: K. PAWSKI

NOTE: DECONTAMINATION OF SAMPLING  
EQUIPMENT AFTER SAMPLING AT LMF.

TIME: 1550

DEPARTED FROM SWMU 21

TIME: 1555

ARRIVED AT SPENT PICKLE LIQUOR TANKS.  
STAINING IS EVIDENT DOWN THE SIDES OF  
THE CONCRETE STANDS UNDER THE TANKS.  
ONE LARGE AREA OF STAINING IS PRESENT  
ON THE GROUND IN FRONT OF THE TANKS.  
A CONCRETE PAD EXTENDS APPROX. 8 FT.  
IN FRONT (SSW) OF THE TANKS AND APPROX.  
10 FT. TO THE WNW OF THE TANKS.  
THE CONCRETE PAD HAS A SMALL DRAIN  
NEAR ITS SE END. STANDING WATER  
ON THE SE END OF THE PAD IS  
A NOTICEABLY ORANGE-RED COLOR.  
THIS IS THE SAME COLOR AS THE  
STAINS ON THE CONCRETE STANDS  
AND THE CONCRETE PAD.

KP

DATE: 7/11/00

(29)

PHOTO # 24

TIME: 1607

DATE: 7/11/00

DIRECTION: E

LOCATION: SWMU 28/29 SPENT PICKLE LIQUOR  
TANKS

PHOTOGRAPHER: K. PAWSKI

NOTE: VIEW OF THE SPENT PICKLE LIQUOR  
(FERROUS CHLORIDE) TANKS. NOTE THE  
ORANGE-RED STAINING ON THE  
CONCRETE STAND AND THE CONCRETE  
PAD.

TIME: 1607

COLLECTED RINSATE BLANK 2000RC02B27

TIME: 1615

LOCATION: SWMU 28/29

BEGAN COLLECTION OF SAMPLE #2000RC02S28.  
SAMPLE COLLECTED FROM THE SE EDGE OF  
THE TANKS, ALONG THE CONCRETE STAND  
(RIGHT AGAINST THE WALL). THE SAMPLE IS  
COMPOSITED FROM FIVE (5) SAMPLES COLLECTED  
WITH A STAINLESS STEEL SPOON AND  
COMPOSITED IN A PLASTIC BOWL.

TIME: 1617

BEGAN COLLECTION OF SAMPLE #2000RC02S29.  
SAMPLE COLLECTED FROM THE SE EDGE OF THE  
CONCRETE PAD AND THE NE EDGE OF THE CONCRETE  
PAD. THE SAMPLE IS COMPOSITED FROM FIVE (5)  
SAMPLES COLLECTED WITH A STAINLESS STEEL SPOON  
AND COMPOSITED IN A PLASTIC BOWL.

KP

(30) DATE: 7/11/00

PHOTO #25

TIME: 1618

DATE: 7/11/00

DIRECTION: NNE

LOCATION: SWMU 28/29

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE 2000RC02S28.

NOTE THE REDDISH SOIL STAIN.

PHOTO #26

TIME: 1621

DATE: 7/11/00

DIRECTION: NNE

LOCATION: SWMU 28/29

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE #2000RC02S29.

NOTE THE REDDISH-ORANGE STAINS ON THE CONCRETE AND THE RED-ORANGE COLOR OF THE SMALL PUDDLE OF STANDING WATER.

TIME: 1632

LOCATION: SWMU 28/29

BEGAN COLLECTION OF SAMPLE #2000RC02S30.

SAMPLE COLLECTED ON WNW SIDE OF TANKS.

THE SAMPLE IS COMPOSITED FROM FIVE (5)

SAMPLES COLLECTED WITH A STAINLESS STEEL

SPOON AND COMPOSITED IN A PLASTIC

BOWL.

KP

DATE: 7/11/00

(31)

PHOTO #27

TIME: 1636

DATE: 7/11/00

DIRECTION: NNE

LOCATION: SWMU 28/29

PHOTOGRAPHER: K. PAWSKI

NOTE: COLLECTION OF SAMPLE #2000RC02S30.

THE SOIL IN THIS AREA IS SIGNIFICANTLY MORE ORANGE-RED IN COLOR THAN SOIL 5 FT. FURTHER AWAY FROM THE TANKS.

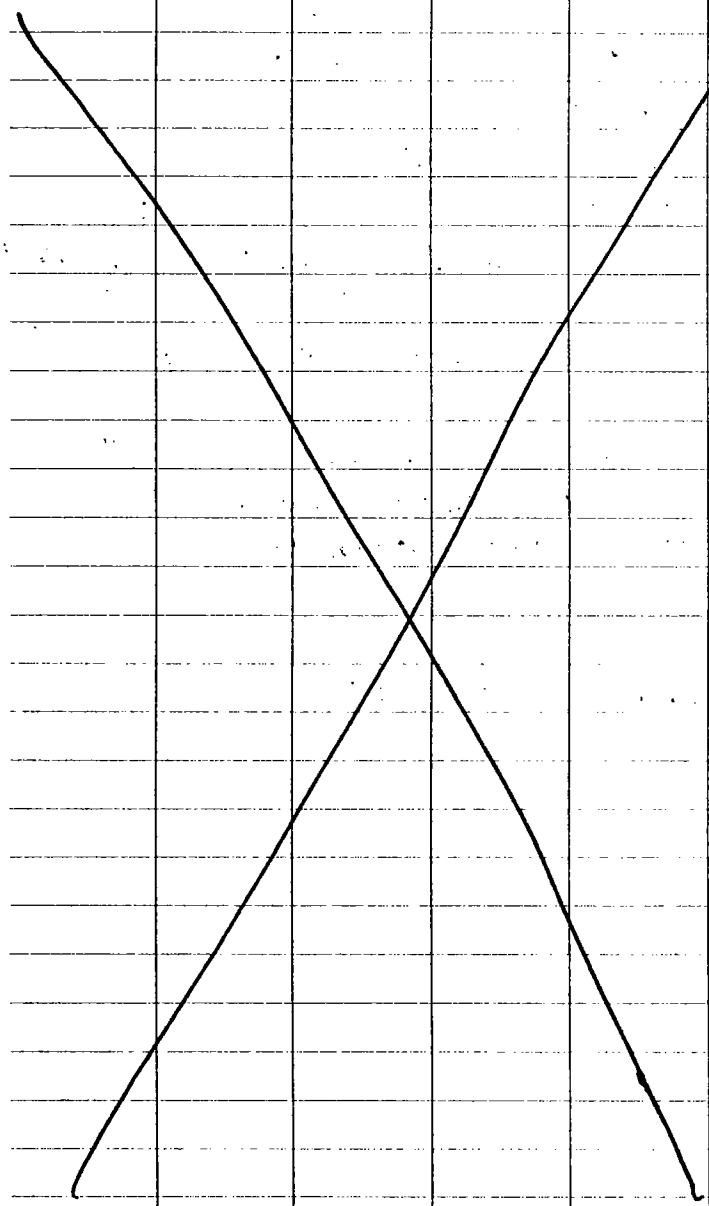
NOTE: SAMPLE NUMBER S31 IS A BLIND DUPLICATE FOR SAMPLE NUMBER S29 - SENT TO ENCHEM LABORATORY.

TIME: 1730

DEPARTED LTV FACILITY.

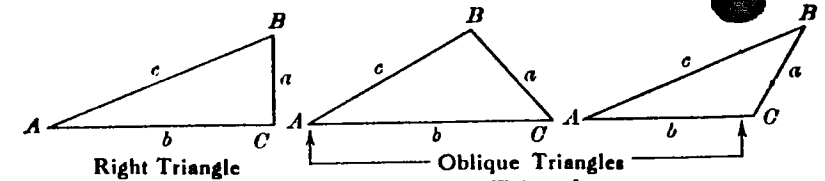
KP

(32)



KP

# TRIGONOMETRIC FORMULAS



## Solution of Right Triangles

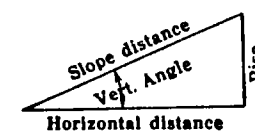
For Angle A.  $\sin = \frac{a}{c}$ ,  $\cos = \frac{b}{c}$ ,  $\tan = \frac{a}{b}$ ,  $\cot = \frac{b}{a}$ ,  $\sec = \frac{c}{a}$ ,  $\csc = \frac{c}{b}$

Given $a, b$	Required $A, B, c$	$\tan A = \frac{a}{b} = \cot B$ , $c = \sqrt{a^2 + b^2} = a \sqrt{1 + \frac{b^2}{a^2}}$
$a, c$	$A, B, b$	$\sin A = \frac{a}{c} = \cos B$ , $b = \sqrt{(c+a)(c-a)} = c \sqrt{1 - \frac{a^2}{c^2}}$
$A, a$	$B, b, c$	$B = 90^\circ - A$ , $b = a \cot A$ , $c = \frac{a}{\sin A}$
$A, b$	$B, a, c$	$B = 90^\circ - A$ , $a = b \tan A$ , $c = \frac{b}{\cos A}$
$A, c$	$B, a, b$	$B = 90^\circ - A$ , $a = c \sin A$ , $b = c \cos A$

## Solution of Oblique Triangles

Given $A, B, a$	Required $b, c, C$	$b = \frac{a \sin B}{\sin A}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
$A, a, b$	$B, c, C$	$\sin B = \frac{b \sin A}{a}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
$a, b, C$	$A, B, c$	$A + B = 180^\circ - C$ , $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ $c = \frac{a \sin C}{\sin A}$
$a, b, c$	$A, B, C$	$s = \frac{a + b + c}{2}$ , $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$ , $C = 180^\circ - (A + B)$
$a, b, c$	Area	$s = \frac{a + b + c}{2}$ , $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
$A, b, c$	Area	$\text{area} = \frac{bc \sin A}{2}$
$A, B, C, a$	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

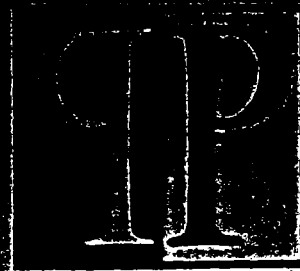
## REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle =  $5^\circ 10'$ . Since  $\cos 5^\circ 10' = .9959$ , horizontal distance =  $319.4 \times .9959 = 318.09$  ft.  
Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained.  $\cos 5^\circ 10' = .9959$ .  $1 - .9959 = .0041$ .  $319.4 \times .0041 = 1.31$ .  $319.4 - 1.31 = 318.09$  ft.

When the rise is known, the horizontal distance is approximately the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance =  $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$  ft.





# JOB BOOK

FROM PENINSULAR PUBLISHING

PROJECT NAME

LTV

PROJECT NUMBER

R05-705

CREW

Todd Quillen Demaree Collier  
Terry Becker

DATE

7/12/00

BOOK #

OF

WEATHER

Sunny, Light Wind, 76°

FIELD BOOK

16 PAGE

8 LEAVES

50% RAG

# CURVE FORMULAS

$$\begin{aligned} L &= R \tan \frac{1}{2} I \\ T &= \frac{50 \tan \frac{1}{2} I}{\sin \frac{1}{2} D} \\ \sin \frac{1}{2} D &= \frac{50}{R} \\ \sin \frac{1}{2} D &= \frac{50 \tan \frac{1}{2} I}{T} \end{aligned} \quad \begin{aligned} R &= T \cot \frac{1}{2} I \\ R &= \frac{50}{\sin \frac{1}{2} D} \\ E &= R \text{ ex. sec } \frac{1}{2} I \\ E &= T \tan \frac{1}{2} I \end{aligned} \quad \begin{aligned} \text{Chord def.} &= \frac{\text{chord}^2}{R} \\ \text{No. chords} &= \frac{1}{D} \\ \text{Tan. def.} &= \frac{1}{2} \text{ chord def.} \end{aligned}$$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

## GENERAL DATA

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt.  $10.10^2 \div 200 = .5$ .  $100 + .5 = 100.5$  hyp.

Given Hyp. 100, Alt.  $25.25^2 \div 200 = 3.125$ .  $100 - 3.125 = 96.875 = \text{Base}$ .

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to  $0.574 d^2$ , where  $d$  is the distance in miles. The correction for curvature alone is closely,  $\frac{1}{2} d^2$ . The combined correction is negative.

PROBABLE ERROR. If  $d_1, d_2, d_3$ , etc. are the discrepancies of various results from the mean, and if  $\sum d^2$  the sum of the squares of these differences and  $n$  the number of observations, then the probable error of the mean =  $\pm 0.6745 \sqrt{\frac{\sum d^2}{n(n-1)}}$

## MINUTES IN DECIMALS OF A DEGREE

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

## INCHES IN DECIMALS OF A FOOT

1-10	3-32	1/4	3-16	1/2	5-16	3/4	1	7/8	1 1/8	1 1/4
.0032	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Arrived at Environmental Conference Room at 0930.

Mike Sickles, Amy, Bill Dowling from ADL

At Roll Mill at 1015

Worked out Grid

First sample time 1027 From Grid

Cell D-1 Sample S32

Thickness of waste less than 1" maybe 1/2 inch.

Fines increase away from water discharge. Coarser close to discharge.

Grid E-1 was too shallow to sample not enough material

Grid E-3 tried next sample time 1046 sample S33

Grid E-2 too shallow to sample

Grid A-3 sample time 1105 S34

Terry still calibrating pH meter and prepping pH samples

S35A-4 sample time 1120 about 1/2" thick

S36A-5 sample time 1133

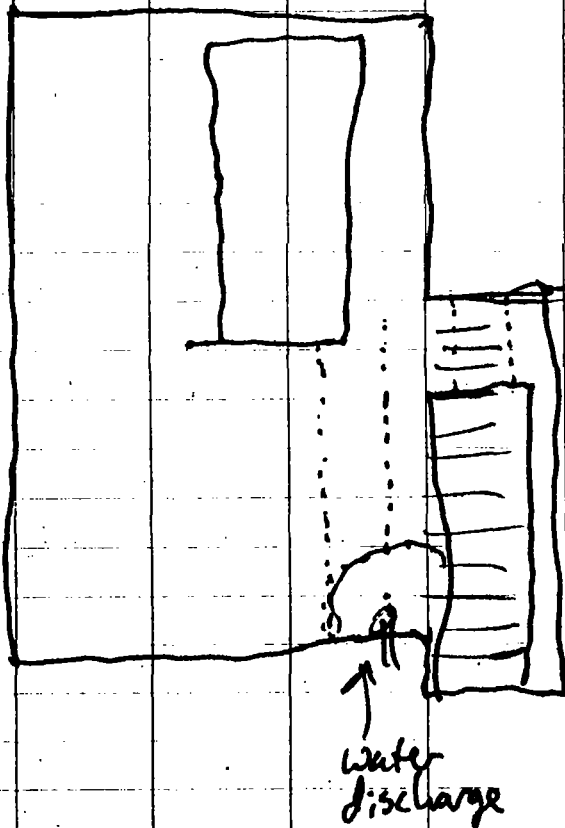
A-6 too shallow

B-6 too shallow

B-5 too shallow

(2)

7/12/00



(3)

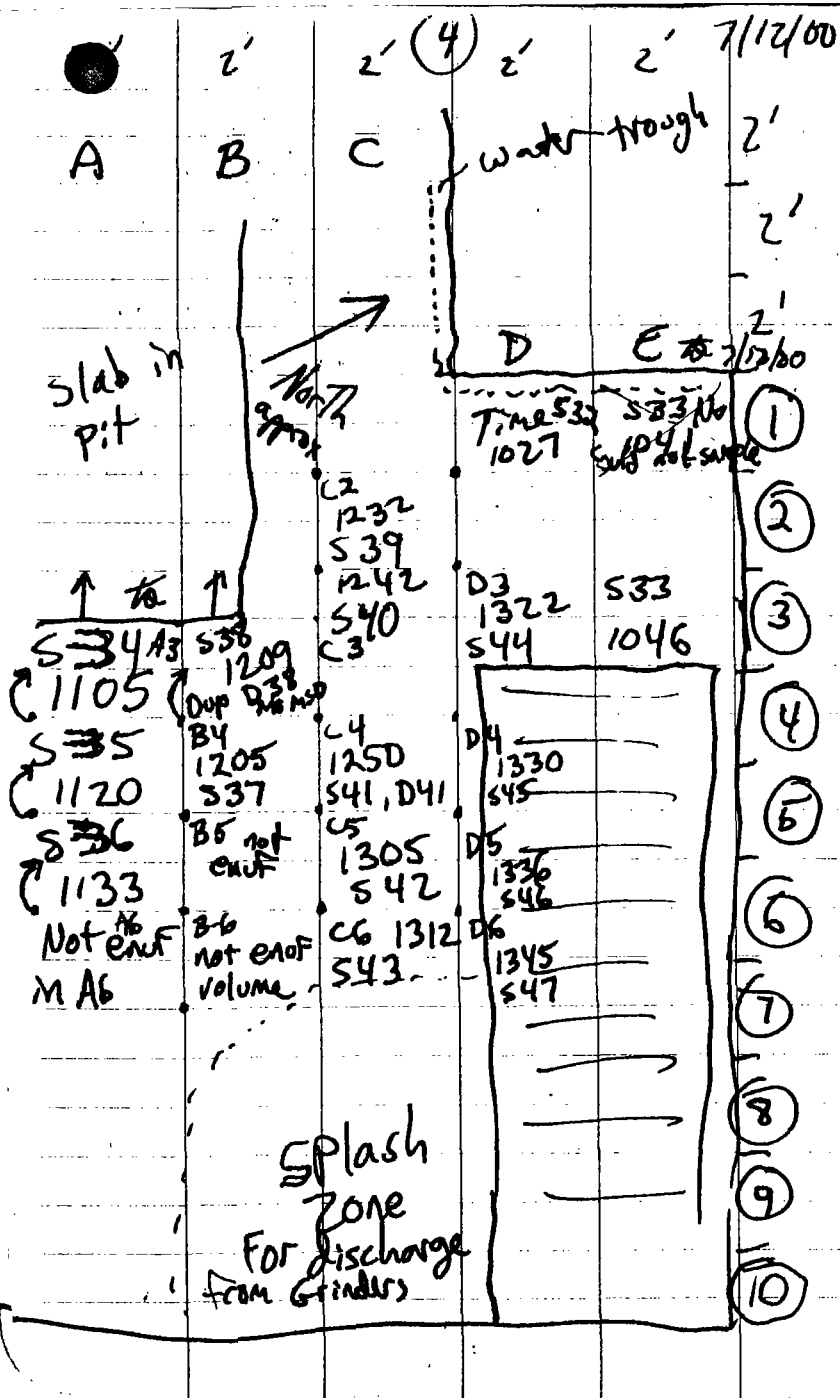
7/12/00

1202 Demaree will try Grid  
 B-4 not a lot of material  
 maybe enough for 40Z jars  
 Sample time 1205 sample S37  
 B3 Sample time 1209 called  
 S38 will do MS/MSD from  
 S38

Duplicate sample D38 will also  
 be collected from grid B-3

Goto Next  
 Page

to



pH (5) 4 5 5 3 1 7/12/00

Calibration on pH meter 7.03 and 9.92 based on estimated temperature

S32 having trouble stabilizing reading because of too much oil in waste At approx 10 minutes pH 6.80 but bounced from 6.60 and 7.12 20 minutes 6.25 40 minutes 6.14 reading Stopped reading.

Because pH was around 7 and lower, Terry will do the next calibration at 7.0 and 4.0 instead of 7.0 and 10.0 like he did before

The 7.0 calibration dropped to 6.27 approx.

1242 Sample time for C-3, sample number S40

1250 Sample time for C-4, sample number S41

Duplicate D41 collected from C-4 same sample time

to



Photo	View	Time	Desc
1-7	W/Down	1124	Sample collection at Grid A-4
1-8	<del>NE</del> 7/12 NW	1227	Terry recalibrating the pH meter after measuring S32
1-9	ENE	1303	Water Flowing into Roll shop waste pit
1-10	W/Down	1334	Sampling at location D-4. Flash did not function
1-11	W/Down	1337	Sampling at D-5 water filling pit because sump.

11/12/00

(7)

7/12/00

1300 finished with C-4

pH calibrated at 7.02 and 4.01 at 1304

1305 sample time for C-5  
sample number S42

Terry running pH on S39

10 minute reading 5.44, 20 minute 5.87

1312 sample time for C-6 sample number S43

C-6 is as close to the water discharge as we could get

pH More steady on S39. Appears to be a better reading

1322 sample time for D-3

sample number S44

1330 sample time for D-4

sample number S45

pH 30 minutes for S39 6.06

1336 sample time for D-5

sample number S46

(8)

7/12/00

(9)

7/12/00

Apparently the sump kicked out  
at around 1330 because  
the pit started filling w/ the water  
Electrician showed up 1345 pump  
started again on its own.

1345 Sample time for D-6

Sample number S47

— pH Sample S45 being run  
Unit stayed in fairly good calibration  
around 6.90 after around 1 minute  
after S39

10 minute reading 7.54, 15 minute reading 7.66

— Started packing up site  
at 1351

Total of 16 samples collected

One MS/MSD at S38

One Dup at S38 = D38

Another Dup at S41 = D41

pH at S32 6.14 after 40 minutes

pH at S39 6.06 after 30 minutes

pH at S45 7.66 after 15 minutes

7/12

(10)

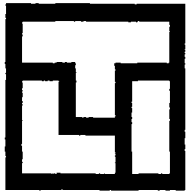
7/12/00

(11)

7/12/00

1355 Final pH reading on 545  
was 7.66. probes on pH meter  
were oily. Due to pump breakdown  
more water was in pit for 545  
than other samples

1400 left roll shop



J. Adenuga

20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606

**TECHLAW INC.**

PHONE: (312) 578-8900  
FAX: (312) 578-8904

**RZ2.R05705.01.ID.047**

June 8, 2000

Mr. Brian Freeman  
U.S. Environmental Protection Agency  
Region 5 DE-9J  
77 West Jackson Boulevard  
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W-99-017; Work Assignment No. R05705; Multi-Site Sampling and Analysis Support; LTV Steel, Inc., East Chicago, Indiana; EPA ID No. IND005462601; Revised Site-Specific Field Sampling and Analysis Plan; Task 02 Deliverable

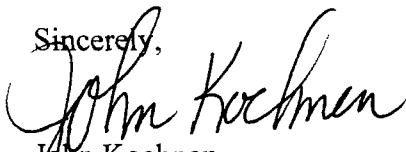
Dear Mr. Freeman:

Please find enclosed TechLaw's revised Site-Specific Field Sampling and Analysis Plan (SAP) for sampling activities proposed at LTV Steel Inc. in East Chicago, Indiana.

This document was revised following a clarification of the sampling scope, made by Mr. Jonathan Adenuga, the U.S. EPA Technical Advisor (TA) and a followup conference call with Michael DeRosa. This clarification provides for the deletion of sampling locations in the No. 2 Tin Mill and No. 3 Strip Mill and the addition of sampling locations in the 84" Strip Mill. The 84" Strip Mill will have their roll shop wastes sampled and analyzed for TCLP chromium and pH.

If you have any questions, please contact me or Mr. Terry Uecker, the TechLaw Work Assignment Manager, at (312) 345-8974.

Sincerely,

  
John Koehnen  
Regional Manager

cc: F. Norling, U.S. EPA, Region 5 (w/o attachment)  
W. Jordan, Central Files  
D. Collier, TechLaw

Jonathan Adenuga, U.S. EPA Region 5  
T. Uecker, TechLaw WAM  
Chicago Central Files





**REVISED SITE-SPECIFIC FIELD SAMPLING AND ANALYSIS PLAN  
LTV STEEL, INCORPORATED, EAST CHICAGO, INDIANA  
EPA ID NO. IND005462601**

**Submitted to:**

**Mr. Brian Freeman  
U.S. Environmental Protection Agency  
Region 5 DE-9J  
77 West Jackson Boulevard  
Chicago, Illinois 60604**

**Submitted by;**

**TechLaw, Inc.  
20 North Wacker Drive, Suite 1260  
Chicago, Illinois 60606**

<b>EPA Work Assignment No.</b>	<b>R05705</b>
<b>Contract Number</b>	<b>68-W-99-017</b>
<b>EPA WAM</b>	<b>Brian Freeman</b>
<b>EPA WAM Telephone No.</b>	<b>(312) 353-2720</b>
<b>EPA Technical Advisor</b>	<b>Mr. Jonathan Adenuga</b>
<b>TA Telephone No.</b>	<b>(312) 886-7954</b>
<b>TechLaw WAM</b>	<b>Terry Uecker</b>
<b>TechLaw WAM Telephone No.</b>	<b>(312) 345-8974</b>

**June 8, 2000**

**REVISED SITE-SPECIFIC FIELD SAMPLING AND ANALYSIS PLAN  
LTV STEEL, INCORPORATED, EAST CHICAGO, INDIANA  
EPA ID NO. IND005462601**

**Introduction**

The following constitutes the Site-Specific Field Sampling and Analysis Plan (SAP) for the sampling activities to be performed by TechLaw at the LTV Steel, Inc. (LTV) facility in East Chicago, Indiana. It is currently anticipated that the sampling activities will be completed during the month of July 2000. However, this date is subject to change at the direction of the United States Environmental Protection Agency Work Assignment Manager (EWAM) or the Technical Advisor (TA), or if scheduling problems arise.

This SAP will be used in conjunction with TechLaw's U.S. EPA approved Region 5 Generic Quality Assurance Project Plan (QAPP) for REPA Sampling Activities, dated July 1999, as well as TechLaw's Site Specific Health and Safety Plan. Samples will be sent to the U.S. EPA Central Regional Laboratory (CRL) if possible. If the CRL cannot analyze the samples due to scheduling conflicts, TechLaw has selected EnChem, Inc. in Madison, WI to perform the analyses required under this SAP.

**Purpose and Objective**

This SAP has been prepared to allow for the collection and analysis of soil, process waste and groundwater samples at LTV. The purpose of this sampling is to determine whether a release of hazardous wastes or hazardous constituents has occurred from Solid Waste Management Units (SWMUs) at LTV. The samples collected will be analyzed for toxicity characteristic leaching procedure (TCLP) chromium, total metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and/or pH. It is currently anticipated that 5 investigative samples total will be collected from each SWMU area, except for the following:

- 6 to 8 samples will be collected from temporary wells to be installed at SWMU 65; and,
- 31 samples will be collected from the 84" Hot Strip Mill.

The TechLaw field activities planned at the LTV site included an initial site visit (which was performed on February 23, 2000) and collection of soil and groundwater samples, including appropriate Quality Assurance/Quality Control (QA/QC) samples, from different SWMUs throughout the site. Currently 81 SWMUs and 5 Areas of Concern (AOCs) have been identified at the site. However, a subset of specific SWMUs to be sampled was determined by the U.S. EPA during and after the site visit (See Samples Section of the SAP).

## **Background Information**

LTV Steel, Inc. is located at 3001 Dickey Road in East Chicago, Lake County, Indiana. The facility is an integrated primary steel manufacturer falling under SIC Codes 3312 and 3479, with capabilities for making iron and steel, cold and hot forming, and tin, zinc and chromium finishing and plating operations. The facility has three blast furnaces, one oxygen furnace, a slab casting complex, and an 84-inch hot strip mill, two cold reduction steel mills, two galvanizing lines and a tin mill. The plant steel making capacity exceeds 3.3 million tons annually.

## **Sample Collection**

### **Soil Samples**

#### *SWMU 11 - Ladle Metallurgy Facility Baghouse*

This unit is a baghouse for the ladle metallurgy facility. A roll off box is located adjacent to the baghouse which contains hazardous cadmium waste. The roll off is located on a concrete pad, although the baghouse itself does not appear to have any secondary containment. It is anticipated that surface dust samples will be collected around and underneath the existing baghouse structure and/or roll off. A sample may also be collected from within the actual roll off in order to compare results from the dust inside the roll off to the surface dust surrounding the roll off. These samples will be analyzed for TCLP metals and/or total metals.

#### *SWMU 28/29 - No. 3 Sheet Mill Spent Pickle Liquor Tanks*

end of the tank Loading area.  
These units are above ground storage tanks (ASTs) which are located outside of the No. 3 Sheet Mill. A secondary containment wall surrounds the tanks. These SWMUs contain spent pickle liquor. Visual contamination was observed on the outside of the containment wall leading to the soil. Surface soil samples will be collected at the base of the containment wall with a hand auger or trowel in the areas where it appears that contamination has occurred. A background sample will be collected near this SWMU, in an area where it does not appear that contamination has occurred. Samples will be analyzed for TCLP metals and/or total metals, anions and pH.

#### *SWMU 45 - No. 2 Tin Mill Waste Sodium Dichromate Truck Loading Station*

This unit is a truck loading station associated with the waste sodium dichromate tank which is located inside the No. 2 Tin Mill. During the site visit, blue staining was observed on the bottom of the loading basin and on the surrounding gravel. This was reportedly a dye material that is added to the waste. Surface soil samples will be collected around the loading station, near the tank area, with a hand auger or trowel and analyzed for TCLP metals and/or total metals and cyanide.

### *SWMU 50 - No. 2 Tin Mill Waste Chromic Acid Tank*

This is an AST which sits outside and has a secondary containment wall surrounding the unit. This SWMU contains waste chromic acid from the metal finishing operations. Soil samples will be collected from around the containment wall with a hand auger or trowel and analyzed for TCLP metals and/or total metals.

### *SWMU 65 - Coke Plant Decanter Site*

This unit was the site of an old decanter tank associated with the facility's former coking operations. The exact location of this unit is not currently known, but an attempt to determine the location will be made prior to sampling. It is anticipated that approximately six to eight temporary wells will be installed. An attempt will be made to use these wells to indicate groundwater flow direction. Also, groundwater samples will be collected from each well. Groundwater samples will be analyzed for SVOCs and TCLP and/or total metals.

### Roll Shop Waste Samples

*Plating Lines*

Samples will be collected from the roll shop wastes generated at the 84" Strip Mill. Grinding stations in this area generate roll shop waste which accumulates in collection boxes. Process waste samples were collected from this mill during a 1996 sampling event. The TCLP levels indicated the process wastes generated from this mill may be characteristically hazardous for chromium. Therefore, additional samples will be collected at this mill to confirm this finding. Based on the existing data, TechLaw utilized statistical methods described in Chapter 9 of the EPA guidance document "Test Methods for Evaluating Solid Waste Physical/Chemical Methods" (SW-846). Page 3 of SW-846 Chapter 9 provides the following equation to determine the appropriate number of waste samples (n) to collect:

$$n = \frac{t^2 s^2}{\Delta^2}$$

where

t = tabulated student's "t" value  
s<sup>2</sup> = sample variance  
Δ = regulatory threshold - sample mean

The historical sample data was statistically evaluated using this equation and it was determined that 31 samples (plus QA/QC) will be collected from the 84" Hot Strip Mill. Samples will be collected from the two containment boxes and/or the four process waste lines located at the grinding stations in this mill area. Samples will be analyzed for field solid pH and TCLP chromium. Multiple pH values will be also be determined in the laboratory.



## Groundwater Samples

In order to collect groundwater samples from the site, a hollow stem auger drill rig or Hydropunch will be used to install approximately six to eight temporary wells in the Coke Plant Decanter Site (SWMU 65). The temporary wells will be installed in order to determine groundwater flow direction and to determine if any releases have occurred at this SWMU. These wells will be placed by a hollow stem auger drilling into the slag and inserting a PVC well with a 10 foot screen into the auger and down into the aquifer. Placement of the majority of the wells may be dependent on the defined derived groundwater flow direction. It is anticipated that three temporary wells will be installed in a triangular pattern in the northwest portion of this area in order to determine the flow direction. The remaining temporary wells will be installed downgradient of the SWMU to evaluate whether a release has occurred at the plant. Groundwater samples will be collected in accordance with TechLaw's U.S. EPA-approved Region 5 Generic QAPP. It is currently anticipated that these temporary wells will be abandoned in place.

## Decontamination

Decontamination of sampling equipment will be undertaken according to TechLaw's U.S. EPA-approved Region 5 Generic QAPP for REPA Sampling Activities. The sampling equipment decontamination solutions will be collected in a container and the wastes managed appropriately.

## Sample Preparation, Custody and Shipment

All sample containers will be acquired as pre-cleaned containers. As necessary, the outside of the sample containers will be cleaned following sample collection to avoid any potential cross-contamination between samples and sample containers. Samples will remain in the custody of TechLaw field personnel until relinquished for shipment to the analytical laboratory. The sample bottles will be appropriately labeled (directly on the face of the bottle) in addition to affixing a sample tag to the container. The samples will be collected in the appropriate sampling containers, as identified in TechLaw's U.S. EPA-approved Region 5 Generic QAPP and will be shipped to the CRL and/or EnChem in coolers packed with ice.

## Analytical Requirements

After collection, all samples will be shipped to the CRL and/or EnChem. All samples will be analyzed for all or a combination of the following: total and/or TCLP (method 1311) metals (method 6010B), VOCs (method 8260B) and SVOCs (method 8270C). The analytical and QA/QC requirements (including calibration procedures and frequencies) for the laboratories are in the appropriate Standard Operating Procedures which are available upon request by the U.S. EPA. See individual SWMUs for the specific analysis to be performed for each area.

2000RC02S16	Cr 267.716	0.03	U	mg/L
2000RC02S16	Pb 220.353	0.10	U	mg/L
2000RC02D16	Cr 267.716	0.03	U	mg/L
2000RC02D16	Pb 220.353	0.10	U	mg/L
2000RC02S17	Cr 267.716	0.03	U	mg/L
2000RC02S17	Pb 220.353	0.10	U	mg/L
2000RC02S19	Cr 267.716	0.03	U	mg/L
2000RC02S19	Pb 220.353	0.10	U	mg/L
2000RC02S20	Cr 267.716	0.03	U	mg/L
2000RC02S20	Pb 220.353	0.10	U	mg/L
2000RC02S21	Cr 267.716	0.03	U	mg/L
2000RC02S21	Pb 220.353	0.10	U	mg/L
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2000RC02S27	Pb 220.353	0.10	U	mg/L
2000RC02S29	Cr 267.716	0.03	U	mg/L
2000RC02S29	Pb 220.353	0.10	U	mg/L
2000RC02D29	Cr 267.716	0.03	U	mg/L
2000RC02D29	Pb 220.353	0.10	U	mg/L
2000RC02S30	Cr 267.716	0.03	U	mg/L
2000RC02S30	Pb 220.353	0.10	U	mg/L



# INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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Governor

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Indianapolis, Indiana 46206-6015  
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[www.state.in.us/idem](http://www.state.in.us/idem)

May 19, 1999

Steven D. Ellis, Esq.  
Environmental Enforcement Section  
Environment and Natural Resources Division  
United States Department of Justice  
P.O. Box 7611  
Ben Franklin Station  
Washington, D.C. 20044

**Re: LTV Steel RCRA Corrective Action**

Dear Steven:

This letter is to follow-up on the May 10, 1999 teleconference between representatives of U.S. EPA Region 5, the U.S. Department of Justice and the Indiana Department of Environmental Management ("IDEM"). The IDEM believes that our discussions were productive, and should result in the effective coordination of all pending RCRA enforcement actions against LTV Steel, Inc. ("LTV Steel").

The IDEM currently has an outstanding enforcement action against LTV Steel that would require the company to undertake RCRA Corrective Action at its' facility. In response to a Notice of Violation issued by the IDEM, LTV Steel provided a voluminous legal analysis that incorrectly concludes that the company is not subject to RCRA Corrective Action. In response to LTV Steel's legal analysis, the IDEM provided a comprehensive factual and legal analysis that outlines why the facility is required to perform RCRA Corrective Action. While the legal issues presented in these documents should be resolved in favor of the government upon the filing of a Motion for Summary Judgment, due to resource concerns, the agency has not yet proceeded with its administrative action. With this in mind, the IDEM believes that a joint approach, in which all governmental parties proceed directly to court, will ensure that the maximum benefit is derived from all governmental resources.

### **Quality Control Samples**

During the sampling activities performed by TechLaw, appropriate quality control samples will be collected in accordance with TechLaw's U.S. EPA-approved Region 5 Generic QAPP. Duplicate samples will be collected at a frequency of at least one for every ten field samples collected per matrix. Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of at least one for every 20 samples collected per matrix. These MS/MSD samples will be analyzed for the same constituents as those in the sample matrix being analyzed.

### **Sample Collection and Data Record**

The samples collected by TechLaw will remain in the custody of the TechLaw Sampling Team until relinquished for shipment to the analytical laboratory. The sample bottles will be appropriately labeled (label affixed directly on the face of the bottle) and tagged with sample tags, and shipped within a cooler which will have two custody seals affixed to the outside of the cooler. A Chain-of-Custody (COC) form will accompany the samples from point of origin to the analytical laboratory. The samples will be collected in the appropriate containers as specified in TechLaw's U.S. EPA-approved Region 5 Generic QAPP.

### **Project Schedule and Report Deliverables**

It is anticipated that the LTV sampling activities will be completed during the week of July 10, 2000. Following completion of the TechLaw field activities and analysis of the resulting samples, the analytical results will be validated by TechLaw at if requested by the EWAM. Data will be received from the CRL and/or EnChem within 30 days of sample submittal.

### **Project Organization**

Mr. Brian Freeman is the EWAM for this project and Mr. Jonathan Adenuga is the TA for the project. The TechLaw WAM for this project is Mr. Terry Uecker. The TechLaw Team Leader and Field Team Leader for the project is Ms. Demaree Collier who will work with other TechLaw personnel in completion of this task.

The laboratory for this project is the CRL in Chicago, IL and/or EnChem in Madison, WI. As necessary, data validation will be performed by appropriately qualified members of the TechLaw Team.



Steven D. Ellis, Esq.  
LTV Steel Corrective Action  
May 19, 1999  
Page 2

I have enclosed a copy of the legal arguments that have been developed by LTV Steel and the IDEM regarding the applicability of RCRA Corrective Action to the company. This information should give us a head start in any future discussions and/or litigation with the company. Once you have had an opportunity to review this material please contact me to discuss.

Sincerely,



Scott R. Storms  
Program Counsel Section Chief  
Office of Legal Counsel

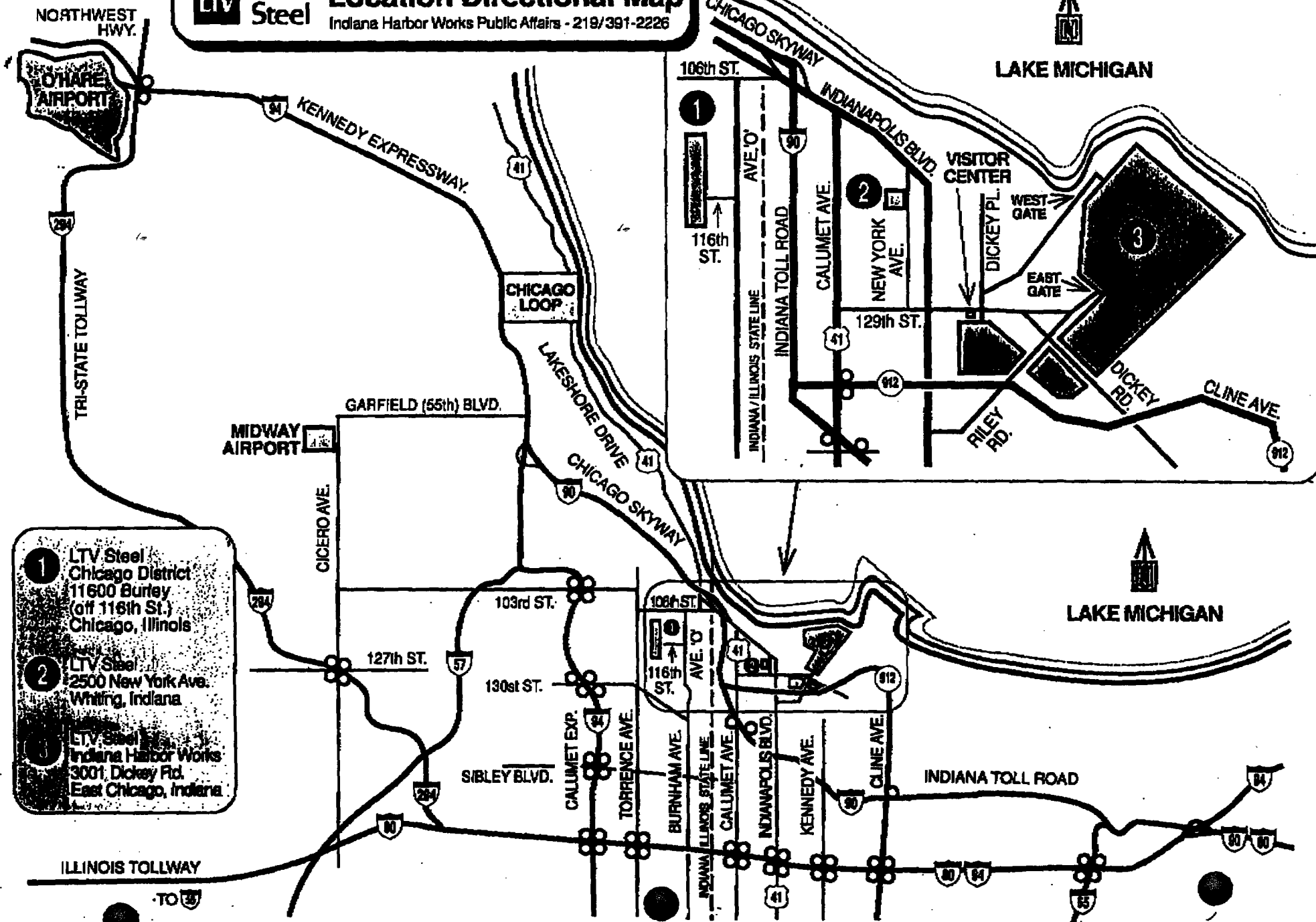
enclosures

cc: Beth Admire, *(w/o enclosure)*  
David Hensel, OLC *(w/o enclosure)*  
Mike Sickels, OSHWM *(w/o enclosure)*  
Ruth Williams OSHWM *(w/o enclosure)*  
Nancy Johnston, OE *(w/o enclosure)*  
Steven D. Griffin, OAG *(w/o enclosure)*



# Location Directional Map

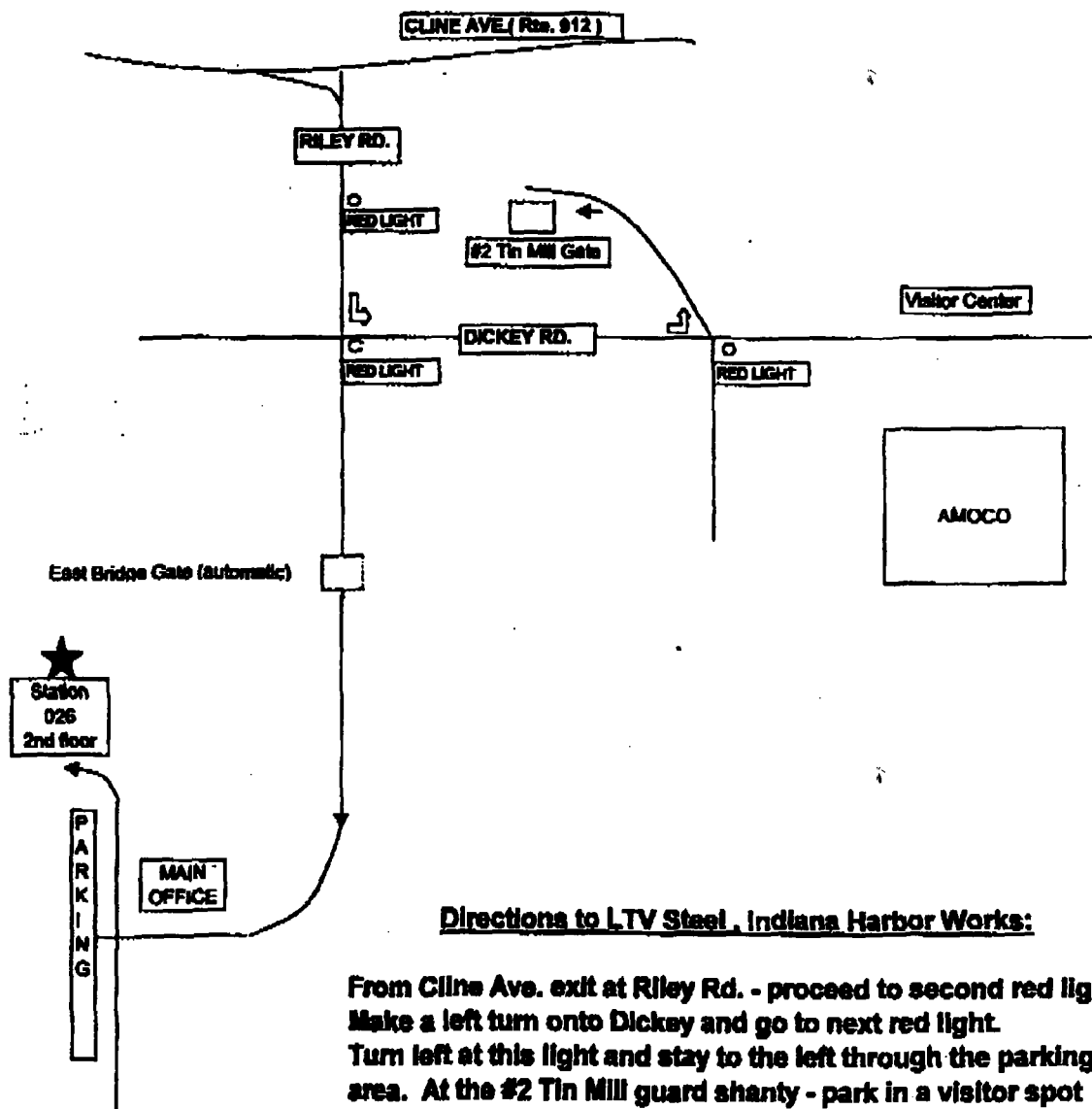
Indiana Harbor Works Public Affairs - 219/391-2226



- 1 LTV Steel  
Chicago District  
11600 Burley  
(off 116th St.)  
Chicago, Illinois
- 2 LTV Steel  
2500 New York Ave.  
Whiting, Indiana
- 3 LTV Steel  
Indiana Harbor Works  
3001 Dickey Rd.  
East Chicago, Indiana

# **REVISED GATE ENTRY PROCEDURES FOR LTV STEEL INDIANA HARBOR WORKS**

## **Safety and Environmental Services Department - Station 026**



### **Directions to LTV Steel, Indiana Harbor Works:**

From Cline Ave. exit at Riley Rd. - proceed to second red light at Dickey Rd. Make a left turn onto Dickey and go to next red light. Turn left at this light and stay to the left through the parking lot area. At the #2 Tin Mill guard shanty - park in a visitor spot and go into the shanty to obtain your proximity card.

Once you receive the proximity pass from the guard, proceed back to Riley Rd. and enter the plant at the East Bridge gate.

You must swipe the card near the black box on a post ahead of the gate shanty. If cars are ahead of you, be sure the gate cycles before you swipe.

When leaving the Plant, swipe the card to open the Exit Gate and DEPOSIT THE CARD in the drop box by the shanty.



LTV Steel Company, Inc.

Indiana Harbor Works

**Safety & Environmental Services**

3001 Dickey Road

Station 026

East Chicago, Indiana 46312-1610

Safety Services Phone Number : (219) 391-3500

Environmental Services Phone Number: (219) 391-2578

Fax Number: (219) 391-3211

**TRANSMISSION SHEET**

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7-7-00	~ 2:45		3
Name	Department/Location	Phone Number	
Johathan			
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Name	Department/Location	Phone Number	
MIKE DEREN	Safety & Environmental Services	219	
From:	LTV Steel - Indiana Harbor Works	391-2853	
<u>Type of Document:</u>			
DIRECTION TO LTV'S EAST CHICAGO PLANT			





SEP 09 1996

SEP 09 1996

DRE-8J

Mr. Al Cross  
LTV Steel Company  
Indiana Harbor Works  
3001 Dickey Road  
East Chicago, Indiana 46312

Re: Sampling at Solid Waste  
Management Units  
LTV Steel Company  
IND 005 462 601

Dear Mr. Cross

This is to inform you that pursuant to the requirements of the Resource Conservation and Recovery Act that the United States Environmental Protection Agency (U.S. EPA) has arranged for the collection of swarf samples from Rollshop processing Units at the LTV Steel Company facility. Specifically, samples will be collected from the No. 2 Tin Mill, No. 3 Sheet Mill and the 84-Inch Hot Strip Mill. Sampling activities are scheduled to begin at the Rollshop Processing Units on September 17 and 18, 1996. U.S. EPA plans to collect approximately 10 to 15 samples from these Rollshop Processessing Units. The Toxicity Characteristic Leaching Procedure would be performed on collected swarf samples. The National Enforcement Investigations Center and the PRC Inc., under contract with, U.S. EPA has received a work assignment to collect these samples at the LTV Steel facility on the above mentioned dates.

If you have any questions, please contact Jonathan Adenuga at (312) 886-7954.

Sincerely yours,

Jonathan Adenuga  
Illinois/Indiana Enforcement and Compliance  
Assurance Branch

cc: John Dirjo, PRC

DRE-8J/JA:be/8/28/96/Filename:a:\sampling.2\

**ENFORCEMENT AND COMPLIANCE ASSURANCE BRANCH**

SECRETAR Y	SECRETARY	SECRETARY	SECRETARY	SECRETARY	SECRETAR Y
1868/28/96					
AUTHOR/ TYPIST	MINN/OHIO SECTION CHIEF	MICHIGAN/ WISCONSIN SECTION CHIEF	ILLINOIS/ INDIANA SECTION CHIEF	ECAB BRANCH CHIEF	WPTD DIVISION DIRECTOR
J.h.A 9/3/96					



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WCC-15J

DATE: FEB 06 1992

SUBJECT: LTV Steel, East Chicago, Indiana Number 2 Intake Flume  
Sediment Characterization Study Plan

FROM: Thomas L. Bramscher *TLB*  
Chief, Enforcement Unit I  
Water Division

TO: Susan Sylvester  
Chief, IL/IN Technical Enforcement Section  
Waste Management Division

Attached is a copy of the LTV Steel, East Chicago, Indiana Sediment Characterization Plan (SCP) that will direct the facility's sampling of the sediment located in the facility's Number 2 Intake Flume this spring. The SCP sediment sampling is being required as a result of a Consent Agreement (CD) reached between LTV Steel and the Agency. The CD requires them to first perform the work in the SCP, then submit, for approval, a remediation plan for all of the Number 2 Intake Flume's sediment. There is specific language in the CD that will require the facility to do additional sampling of the sediment if the initial SCP sampling is deficient. That is, the CD states that LTV Steel has to do what ever is necessary for them to do in order to meet any Federal, State and/or local regulatory requirement that is associated with the sediment remediation plan that LTV Steel develops as a result of the initial SCP sampling.

I would appreciate it if you would have someone from your staff review and comment on the SCP by February 28, 1992.

If you have any questions concerning this subject please feel free to contact me at 6-6753 or Ron Kovach of my staff at 6-1441.

Attachment

SEDIMENT CHARACTERIZATION STUDY PLAN

for the

No. 2 Intake Flume, LTV Steel

East Chicago, Indiana

Prepared by

Floyd Browne Associates, Inc.

Marion, Ohio

Revision No. 0



## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page No.</u>
1.0	Project Description And Background	1
1.1	Introduction	1
1.2	Site Description	1
1.3	Background	6
1.4	Target Compounds	8
1.5	Project Objectives	10
1.6	Sample Network And Rationale	12
1.7	Project Schedule	12
2.0	Project Organization And Responsibility	12
2.1	Management Responsibilities	12
2.2	QA Organization	12
2.3	Field Operations	14
2.4	Lab Operations	14
3.0	Quality Assurance Objectives For Measurement Data In Terms Of Precision, Accuracy, Completeness, Representativeness, And Comparability	14
3.1	Precision	14
3.2	Accuracy	14
3.3	Completeness	15
3.4	Representativeness	15
3.5	Comparability	15
3.6	Quality Control Samples	15
4.0	Field Sampling Plan	20
4.1	Site Background	20

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page No.</u>
4.2	Sampling Objectives	20
4.3	Sampling Location And Frequency	20
4.4	Sample Designation	22
4.5	Sampling Equipment And Procedures	22
4.6	Sample Handling And Analysis	30

List of Tables

<u>Table No.</u>	<u>Title</u>	<u>Page No.</u>
1	Inorganic Target Compounds And Project Required Detection Limits	8
2	Organic Target Compounds And Project Required Detection Limits	9
3	Data Quality Summary	11
4	Data Collection Plan Summary	11
5	Project Organization	13
6	Precision And Accuracy Of Analytical Methods	15
7	Summary Table Of Sampling And Analysis Program	23
8	Field Equipment	24
9	Sample Preservatives And Containers	31

List Of Figures

<u>Figure No.</u>	<u>Title</u>	<u>Page No.</u>
1	General Site Location Map	2
2	Map Showing Physiographic Units After Hartke And Others, 1975	4

TABLE OF CONTENTS (Continued)

List Of Figures (Continued)

<u>Figure No.</u>	<u>Title</u>	<u>Page No.</u>
3	General Geologic Column From Surface To The Precambrian Basement After Hartke And Others, 1975	5
4	Potentiometric Map Of The Calumet Aquifer	7
5	Cross-Section of Intake Flume Profile: Example	21
6	Sediment Description Form	29

List of Plates

Plate No.

- 1 General Location Map
- 2 Geology of the Unconsolidated Deposits
- 3 Proposed Profile Locations

## 1.0 Project Description and Background

### 1.1 Introduction

The Sediment Characterization Study (SCS) is the first phase of a three phase study and implementation program initiated by a complaint filed by the United States of America on behalf of the United States Environmental Protection Agency (USEPA) against LTV Steel Company, Inc. (LTV). The complaint alleged that LTV violated Section 301 of the Clean Water Act, 33 U.S.C. 1311, 1342, concerning oil spills and unpermitted discharges of pollutants into navigable waters specifically the No. 2 Intake FLUME (hereafter referred to as FLUME). LTV and the USEPA agreed on a settlement of this complaint, and in the best interest of both parties, subdivided the Consent Decree requirements into a three phase study and implementation program. The three phases of the program are:

- Phase I - Sediment Characterization Study (SCS)
- Phase II - Sediment Removal and Disposal Plan (SRDP)
- Phase III - Sediment Removal and Disposal Project (SRDPj)

This Sediment Characterization Study Plan (SCSP) deals with Phase I of this program. The accompanying Quality Assurance Project Plan (QAPjP) further discusses laboratory QA/QC methods and requirements.

The purpose and implementation of the SCS is to identify the extent and nature of pollution in the FLUME. The SCS will be used by LTV to develop a SRDP in order to implement the removal and disposal project.

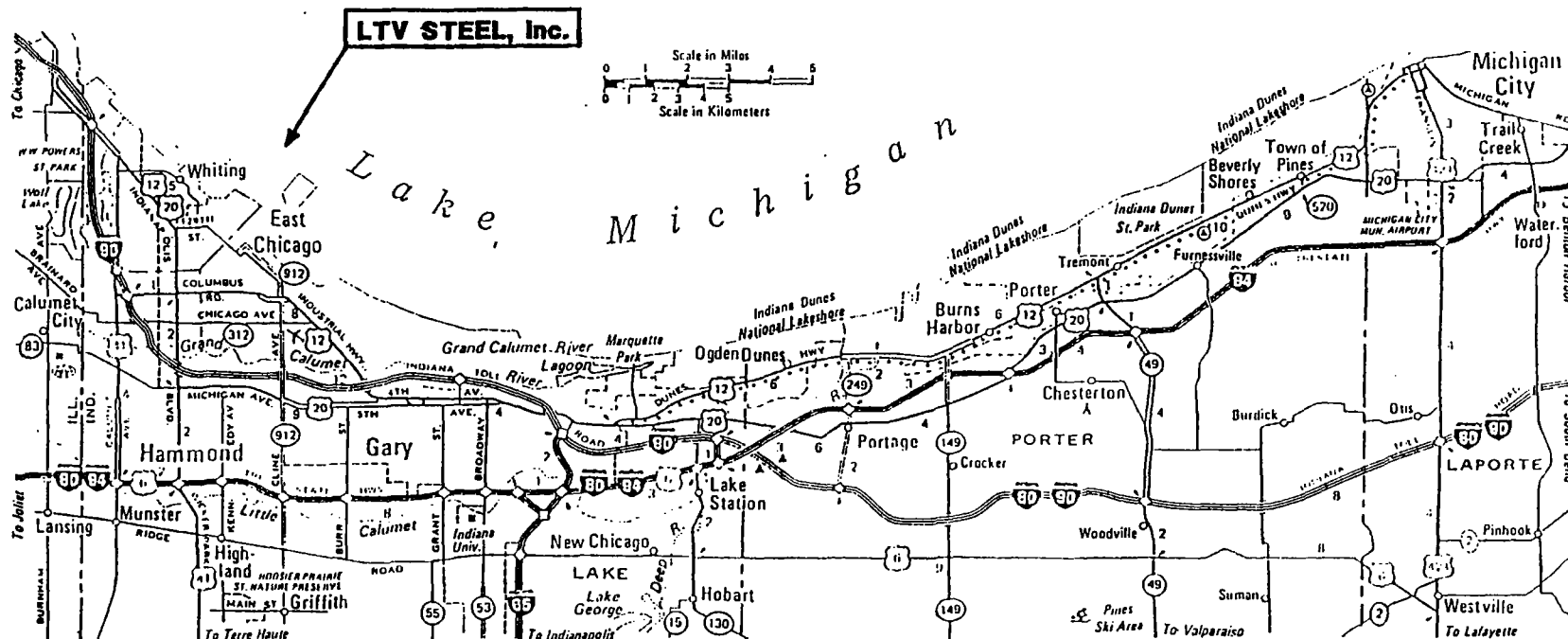
### 1.2 Site Description

- 1.2.1 The LTV facility is located in the northern one quarter of Lake County, East Chicago. The facility covers more than 1,200 acres on the southern shore of Lake Michigan. It is bordered by the Indiana Harbor Canal (IHC) to the east and northeast, by Lake Michigan to the north and northwest and by Amoco to the south and southwest. See Figure No. 1 and Plate 1 for general and site location.

#### 1.2.2 Physical Features

Prior to the late 1960's the area encompassing the FLUME laid along the shores of an inlet of Lake Michigan. During the late 1960's a slag-fill program was initiated and began filling this inlet with slag until completion of the project in the late 1970's. The present physical features of the FLUME were formed from the build-up of slag along the sides of the FLUME while original lake bottom sediments remained at the bottom of the FLUME. The FLUME extends 3,200 feet from the No. 2 Pump House to the breakwall of the IHC. LTV draws water from Lake Michigan through the FLUME at an estimated rate of 26 million gallons per day.





LTV STEEL COMPANY  
EAST CHICAGO, INDIANA  
**GENERAL SITE  
LOCATION MAP**



FLOYD BROWNE ASSOCIATES, INC.  
DEPARTMENT OF GEOSCIENCES  
MARION, OHIO  
FIGURE NO. 1

### 1.2.3 Topography

Part of the area encompassing the LTV facility was originally covered by dunes and linear ridges that were remnants of past shorelines and glacial retreat (Hartke and others, 1975). Physical changes in the area due to industrial development included the leveling of dunes and ridges, the filling of wetlands and extension of lakeshore with fill material. The area encompassing the SCS consists mainly of this fill land.

### 1.2.4 Geology

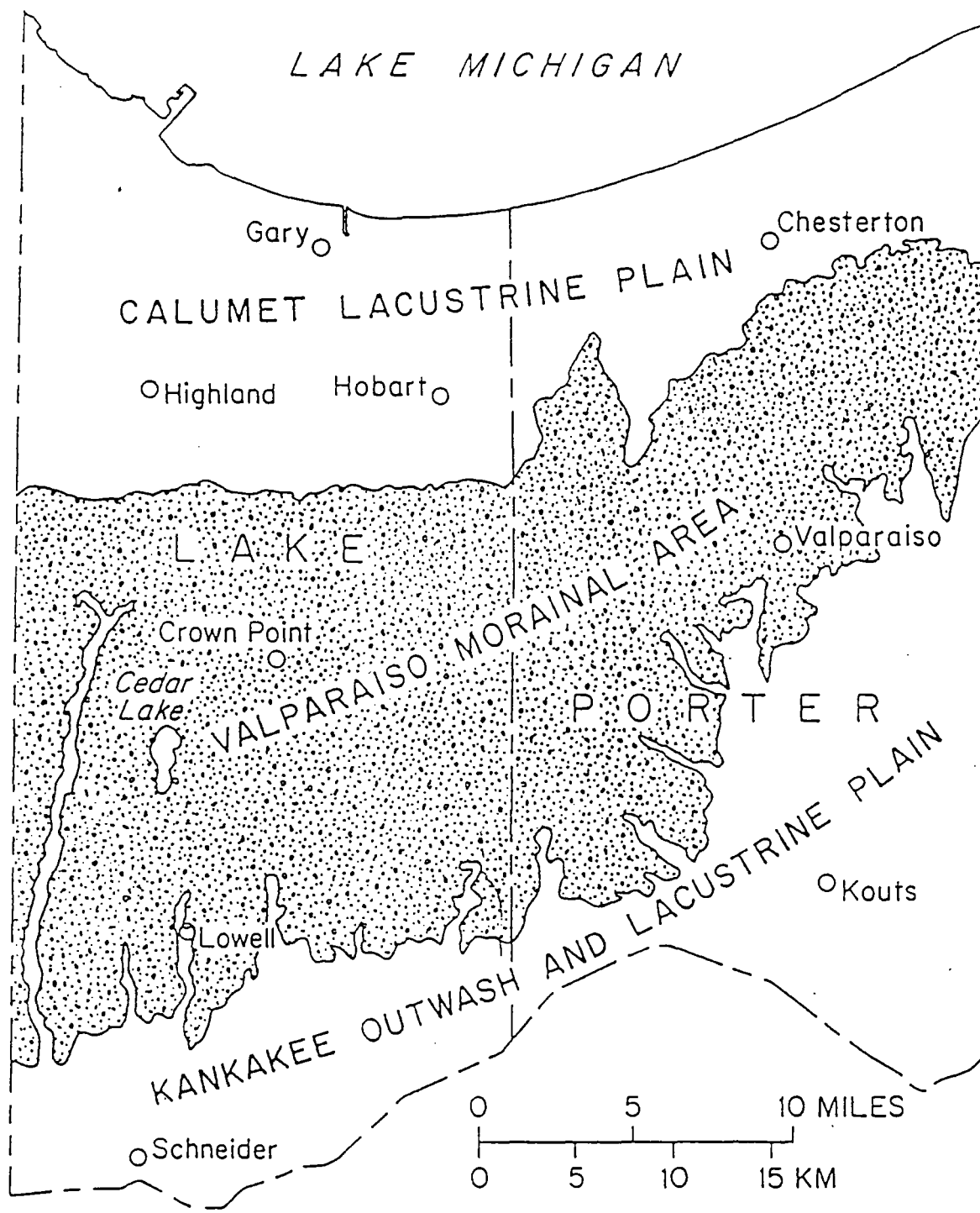
The area which the SCS encompasses is entirely within the physiographic province known as the Calumet Lacustrine Plain and extends from the shoreline of Lake Michigan to the Valparaiso Moraine, 20 miles south, Figure No. 2 (Hartke and others, 1975). The bedrock is composed of carbonates of Silurian age. The unconsolidated materials were deposited during the last major ice advance (Wisconsinan age) by ice, wind and water (Hartke and others, 1975). In general, deposits in the area consist of dune and beach sands, lacustrine silts, and sands and gravels (Plate 2).

These deposits form an extensive surficial aquifer referred to as the Calumet Aquifer (Hartke and others, 1975). The Calumet Aquifer is underlain by 100 to 150 feet of unconsolidated glacial and lacustrine sediments that were deposited on a bedrock erosional surface. Figure No. 3 is a generalized geologic column showing lithologic units underlying the SCS area. According to Watson and others (1989), the most prominent feature of the bedrock surface is a north trending valley in the area where the IHC trends northeast-southwest.

### 1.2.5 Hydrogeology

The study area lies within the Grand Calumet River (GCR) basin encompassing 43,242 acres and is almost entirely within Lake County, Indiana (FWPCA, 1967). The GCR basin is bordered by the basins of the Little Calumet River to the south and Lake Michigan to the north.

Flow within the river system is sluggish, estimated to average 16 cu. ft./sec. in the west branch and 880 cu. ft./sec. in the east branch (FWPCA, 1967). Frequent flow reversals are known to occur depending on the stage of Lake Michigan.

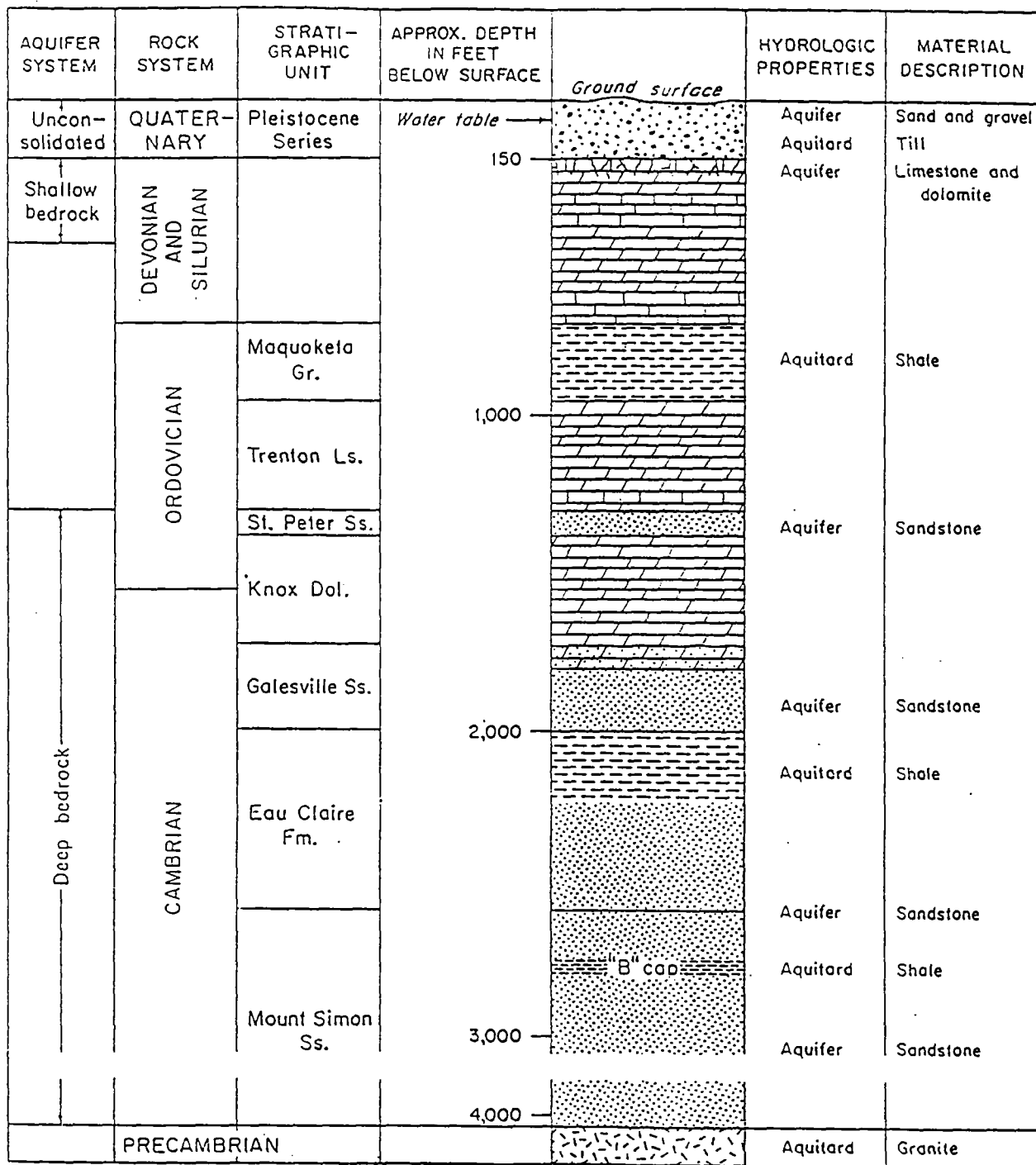


LTV STEEL COMPANY  
EAST CHICAGO, INDIANA  
**MAP SHOWING PHYSIOGRAPHIC  
UNITS AFTER  
HARTKE AND OTHERS, 1975**



FLOYD BROWNE ASSOCIATES, INC.  
DEPARTMENT OF GEOSCIENCES  
MARION, OHIO  
FIGURE NO. 2

NOT TO SCALE



LTV STEEL COMPANY  
EAST CHICAGO, INDIANA  
**GENERAL GEOLOGIC COLUMN  
FROM SURFACE TO THE  
PRECAMBRIAN BASEMENT  
AFTER HARTKE AND OTHER, 1975**



FLOYD BROWNE ASSOCIATES, INC.  
DEPARTMENT OF GEOSCIENCES  
MARION, OHIO  
FIGURE NO. 3

NOT TO SCALE



The Calumet Aquifer within the GCR basin consists mainly of fine to medium grained sand and gravel and is overlain locally by slag fill. In general, the aquifer thickness ranges from 0 to 65 feet and the maximum saturated thickness is approximately 45 feet (Rosenshein and Hunn, 1968; Hartke and others, 1975). Based on the report by Watson and others (1989), broad water-table mounds with low gradient underlie the area between Lake Michigan and the GCR/IHC and the Little Calumet River to the south (Figure No. 4). The crest of these mounds form water table divides that trend east-west. The direction of flow is generally from the water table mounds to major streams or to Lake Michigan. Locally, ground water discharges directly to Lake Michigan.

### 1.3 Background

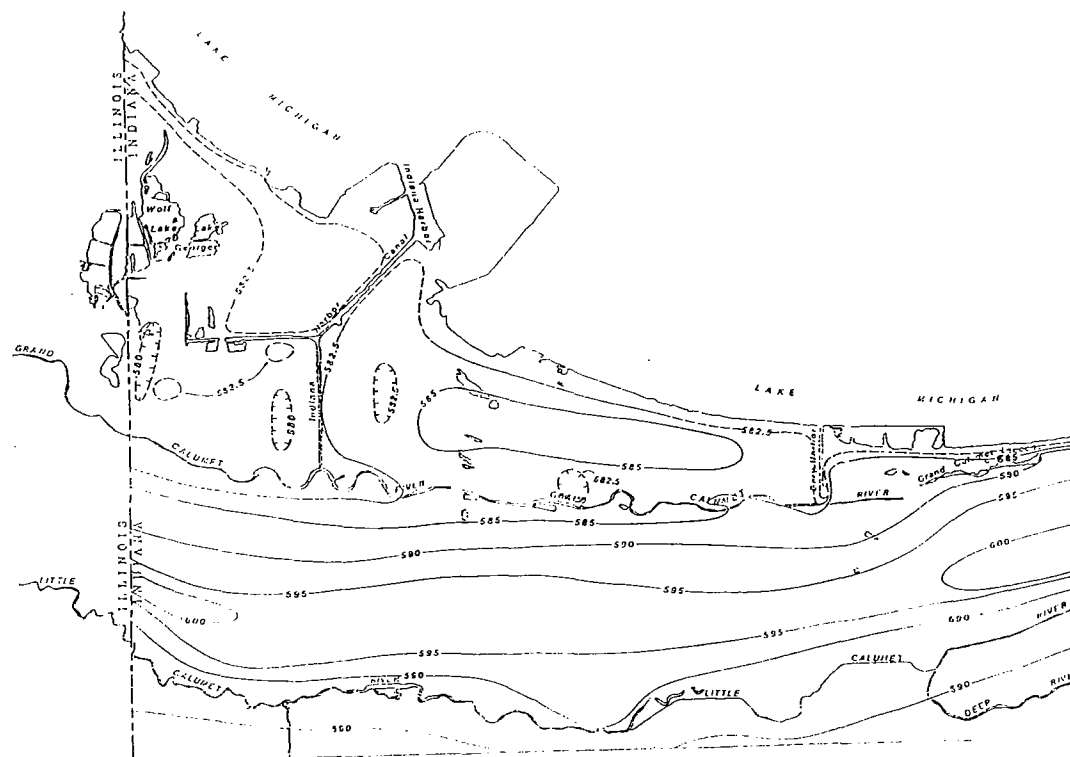
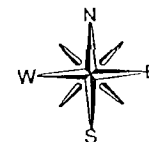
Late in the 19<sup>th</sup> century as industrial land in Chicago was developed, the nearby lakeshore lands in Indiana also became desirable areas for development. Construction of petroleum refineries and steel mills led to the development of one of the most intensely industrialized regions in the world.

Industrialization in and around the present facility began with the construction and completion of the IHC in 1901 through 1906. Construction on the present site began in 1906 following the purchase of 92 acres of lakefront property by Mark Manufacutring Company (MMC) (Mason, 1991). Shortly following the purchase, MMC started filling out the shoreline of Lake Michigan.

In 1923 MMC was purchased by the Youngstown Sheet and Tube Company (YSTC). Industrial development continued through 1969 when the YSTC was purchased by Lykes Steamship Company. Many mergers within the steel industry occurred during this time period, the most important of which was the creation of the LTV Steel Company. The present day LTV Steel Company gained control of the facility in 1978 (Mason, 1991).

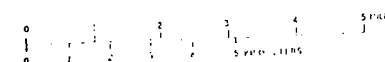
On October 1, 1986, the Indiana Department of Environmental Management (IDEM) issued a National Pollutant Discharge Elimination System (NPDES) permit to LTV which expired September 29, 1991 (Decree, 1991).

On February 26, 1988, approximately 300 to 400 gallons of oil was reported to have leaked from an oil separation pond into the FLUME (Decree, 1991). LTV responded and was able to recover a considerable amount of the oil spilled (Decree, 1991).



#### EXPLANATION

WATER-TABLE CONTOUR--shows water-table altitude.  
Hachures indicate depression. Intervals 2.5 and 5 feet.  
Dashed where approximate. Datum is sea level



BASE FROM U.S. GEOLOGIC SURVEY 1:24,000 QUADRANGLES  
AFTER WATSON AND OTHERS, 1989

NOT TO SCALE

LTV STEEL COMPANY  
EAST CHICAGO, INDIANA  
**POTENTIOMETRIC MAP  
OF THE CALUMET AQUIFER**



FLOYD BROWNE ASSOCIATES, INC.  
DEPARTMENT OF GEOSCIENCES  
MARION, OHIO  
FIGURE NO. 4

On March 9, 1988, USEPA representatives observed two alleged unpermitted discharge points from one pipe into the FLUME and another pipe into the oil separation pond.

In 1991, the USEPA and LTV agreed on a settlement; among the provisions, LTV is to develop and implement a Sediment Characterization Study, Sediment Remediation and Disposal Plan and a Sediment Remediation and Disposal Project.

#### 1.4 Target Compounds

The target compounds for this study as required by the consent decree are listed in Tables No. 1 and 2. Table No. 1 lists the inorganic target compounds and TCLP parameters along with their project required detection limits and Table No. 2 lists the organic target compounds along with their corresponding project required detection limits.

Table 1: Inorganic Target Compounds and Project Required Detection Limits

Compound	Req'd Detection Limit* (Sediments)
Metals (Total)	
Arsenic	0.3 mg/kg
Cadmium	0.3 mg/kg
Chromium	0.2 mg/kg
Lead	0.2 mg/kg
Zinc	0.5 mg/kg
Cyanide, Reactive	1 mg/kg
Sulfide, Reactive	1 mg/kg
Flashpoint (open Cup)	20°
TCLP	
Metals	
Arsenic	0.5 mg/l
Barium	10.0 mg/l
Cadmium	0.1 mg/l
Chromium	0.5 mg/l
Lead	0.5 mg/l
Mercury	0.02 mg/l
Selenium	0.1 mg/l
Silver	0.5 mg/l
Semivolatiles	
m-Cresol	1 mg/l
p-Cresol	1 mg/l
o-Cresol	1 mg/l
1,4-Dichlorobenzene	0.02 mg/l
2,4-Dinitrotoluene	0.08 mg/l
Hexachloro-1,3-butadiene	0.06 mg/l
Hexachlorobenzene	0.04 mg/l
Hexachloroethane	0.06 mg/l
Nitrobenzene	0.04 mg/l

Pentachlorophenol	1 mg/l
Pyridine	0.02 mg/l
2,4,5-Trichlorophenol	1 mg/l
2,4,6-Trichlorophenol	0.10 mg/l
Pesticides	
Chlordane	.02 mg/l
Endrin	.01 mg/l
Heptachlor	0.008 mg/l
Heptachlor Epoxide	0.008 mg/l
Lindane	0.02 mg/l
Methoxychlor	0.20 mg/l
Toxaphene	0.10 mg/l
Herbicides	
2,4-Dichlorophenoxyectic Acid (2,4-D)	1 mg/l
2,4,5-Trichlorophenoxypropinic Acid (Silvex)	0.4 mg/l
Volatiles	
Benzene	0.10 mg/l
Carbon Tetrachloride	0.05 mg/l
Chlorobenzene	0.10 mg/l
Chloroform	0.10 mg/l
1,2-Dichloroethane	0.10 mg/l
1,1-Dichloroethylene	0.10 mg/l
Methyl Ethyl Ketone	1.0 mg/l
Tetrachloroethylene	0.10 mg/l
Trichloroethylene	0.10 mg/l
Vinyl Chloride	0.10 mg/l

\* Note that these required detection limits are matrix dependent as stated in USEPA SW 846.

Table 2: Organic Target Compounds and Project Required Detection Limits

Compounds	Req'd Detection Limit* (Sediments) <i>ppb</i>
PAH's	
Acenaphthene	750 ug/kg
Acenaphthylene	750 ug/kg
Anthracene/Phenanthrene	750 ug/kg
Benzo(a)anthracene	750 ug/kg
Benzo(a)pyrene	750 ug/kg
Benzo(b)fluoranthene	750 ug/kg
Benzo(k)fluoranthene	750 ug/kg
Chrysene	750 ug/kg
Dibenzo(a,h)anthracene	750 ug/kg
Fluoranthene	750 ug/kg
Indeno(1,2,3-cd)pyrene	750 ug/kg
Pyrene	750 ug/kg
Napthalene	750 ug/kg



PCB's (Method 8080)  
TPH

100 ug/kg  
50 mg/kg

\* Note that these required detection limits are matrix dependent as stated in USEPA SW 846.

## 1.5 Project Objectives

### 1.5.1 Project Objectives

The principal objective of the SCS is to quantify the volume of sediments in the No. 2 Intake FLUME and identify the extent, magnitude and nature of contamination in those sediments from the "air curtain" near the water intakes on the southwest end of the FLUME to the breakwater on the far northeast end of the FLUME.

### 1.5.2 Data Usage

The data obtained during the SCS shall be used in assessing the quality and quantity of the sediments in the FLUME and to aid in the development of a Sediment Removal and Disposal Plan (SRDP).

Field data obtained from the MicroTIP Photoionization Detector (PID) will be used to assess ambient air quality for health and safety purposes.

### 1.5.3 Data Quality Objectives

Data Quality Objectives (DQOs) were developed based upon the principal project objective of characterizing the quantity and quality of sediments in the FLUME and the intended use of the data, site characterization and evaluation of remedial action alternatives by LTV Steel, USEPA, and LTV's contractors. The data quality objectives are summarized in Table No. 3.

The contaminants of concern and the corresponding project required detection limits are listed in Section 1.4. Levels of concern are not quantifiable at this time as the magnitude and nature of contamination is not known. Given these conditions, Level III analytical work is sufficient to provide data of the quality necessary for this project.

The data collection plan is devised such that the quality of data needed can be collected. A summary of the plan including the sample types, the number of samples, QA/QC samples and analytical methods to be used, is given in Table No. 4 and a detailed description of the plan is given in Section 4.0. Statements concerning precision, accuracy, representativeness, completeness, and comparability (PARCC) are given in Section 3.0.

TABLE NO. 3 - DATA QUALITY SUMMARY

Objective	Sediment chemical data are required to evaluate the extent, magnitude and nature of contamination in the No. 2 Intake FLUME sediments from the "air curtain" near the water intakes on the southwest end of the FLUME to the breakwater on the far northeast end of the FLUME.
Data Use	Site characterization, Evaluation of Remedial Action Alternatives
Data Users	LTV Steel, USEPA, LTV's contractors
Analytical Level	Site Characterization: Level I, II, or III Evaluation of Remedial Action Alternatives - Level II, III, or IV
Contaminants of Concern	See Tables No. 1 and 2 in Section 1.4
Levels of Concern	N/A
Req'd Det. Limits	See Tables No. 1 and 2 in Section 1.4
Critical Samples	N/A

TABLE NO. 4 - DATA COLLECTION PLAN SUMMARY

Staff	Hydrogeologists, Geotechnicians
Data Type	See Tables No. 1 and 2 in Section 1.4
Sample Type	FLUME sediment composite samples of vertical horizons (Environmental, Biased)
# of samples	6 profiles with two samples each (12 samples)
QA/QC Samples	Co-located samples - 2 (approximately 15%) Replicate Samples - 2 (approximately 15%) 2+2 general QA/QC samples
Background Samples	N/A
Sampling Procedure	Vibra - Core
Analytical Methods	See Tables No. 10, 11 and 12 in the QAPjP
PARCC	See Section No. 3: Quality Assurance Objectives for Measurement Data . . .

## 1.6 Sample Network and Rationale

The sampling network is described in Section 4.3.2 and the rationale in Section 4.2.

## 1.7 Project Schedule

1. Completion and submittal of QAPjP and SCSP to USEPA by 10/31/91.
2. USEPA comments on QAPjP and SCSP by 1/31/92.
3. Integration of USEPA comments and resubmittal of QAPjP and SCSP by 4/1/92.
4. Initiation of field work by 6/1/92.
5. Submittal of final report to USEPA by 09/30/92.

## 2.0 Project Organization and Responsibility

LTV Steel has overall responsibility for all phases of the sediment characterization plan. LTV's contractors will perform the field investigations and prepare all reports. A project organization chart is presented in Table No. 5.

### 2.1 Management Responsibilities

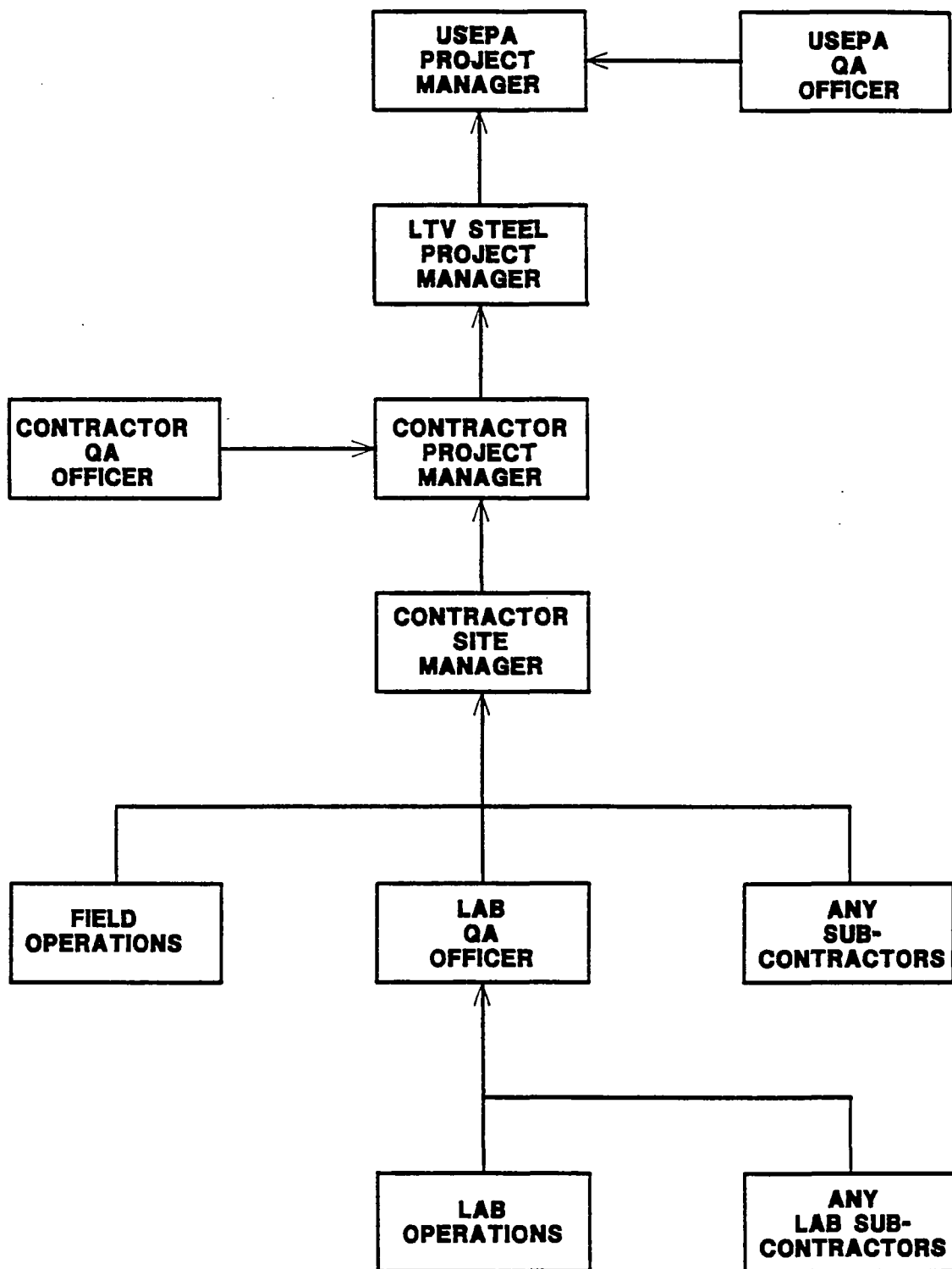
Operational responsibilities involving execution and direct management of the technical and administrative aspects of this project have been assigned as follows:

1. LTV Steel Project Manager
2. Contractor Project Manager
3. Contractor Site Manager

### 2.2 QA Organization

<u>Task</u>	<u>Responsible Organization/Personnel</u>
Final review/approval of QAPjP	USEPA Region V RPM & QA officer
QA review and approval of reports and field activities; audits of reports, procedures, and activities for identifying and controlling non-conformance for corrective actions	Contractor QA Officer
Evidence audits of field records	Contractor Project Manager

**TABLE NO. 5  
PROJECT ORGANIZATION**





#### Data Assessment

Contractor Project Manager

External Performance and system audits of laboratory and field activities

USEPA Region V Environmental Services Division

Performance and system audits of laboratories

Laboratory QA Officer

Performance and system audits of field activities

Contractor QA Officer

Approval of QA program and laboratory test procedures

USEPA Region V QA section

Maintenance of project evidence file

Contractor Project Manager

### 2.3 Field Operations

#### Task

#### Responsible Organization/Personnel

Sample collection

Contractor Site Manager

Field measurements

Contractor Site Manager

### 2.4 Lab Operations

#### Tasks

#### Responsible Organization/Personnel

Inorganic Parameter Analysis and Physical Testing

Laboratory

Organic Parameter Analysis

Laboratory

### 3.0 Quality Assurance Objectives for Measurement Data in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability.

#### 3.1 Precision

The sediment samples obtained will be analyzed using standard SW-846 EPA methods. The historical precision of these methods for the target compounds is given in Table No. 6. QC samples will be analyzed to determine the precision obtained in this study. To ensure that an accurate estimate of precision is obtained, approximately 30% of the samples will be replicates, either co-located or field duplicates. The precision will be compared with the historical values to ensure quality data is obtained.

#### 3.2 Accuracy

The historical accuracy of the analytical methods used is also listed in Table No. 6. The actual accuracy achieved will be determined from evaluation of the QC samples.

### 3.3 Completeness

A completeness level of 90% for the field and 95% for the lab is acceptable for the sediment thickness and analytical profiles as these samples are not critical.

### 3.4 Representativeness

Composite samples will be analyzed to ensure that the sample is representative of each profile. The representativeness of the samples will be evaluated through the use of co-located samples.

### 3.5 Comparability

The use of standard, published sampling and analytical methods incorporating the QC samples described below will ensure precise and accurate data which will be representative of the site. This data will then be able to be compared with other data which is of a similar quality from this site or elsewhere.

### 3.6 Quality Control Samples

Quality Control samples will be used to ensure that the quality assurance objectives are met. The type and frequency of the quality control samples to be used follows:

- 1.) Co-located Samples - 15%.
- 2.) Replicate Samples - 15%.
- 3.) Laboratory QA/QC Samples - See Section 11.0 of the QAPjP for a discussion of these samples.

TABLE 6: Precision and Accuracy of Analytical Methods

#### METHOD 8080 (SW-846)

The Polychlorinated Biphenyls (PCB's) will be run using USEPA Method 8080 found in SW-846. The sample will be reanalyzed if the spike recovery is unacceptable according to the professional judgment of the analyst, using the guidelines listed below:

#### METHOD 8080

#### PCB SPIKES

INTERNAL  
CONTROL LIMITS  
SOIL MATRIX  
%

---

Aroclor 1254	20-180
Aroclor 1260	20-180
Dibutyl Chlorendate (surrogate)	20-180

---

## TABLE NO. 6 (Continued)

## METHOD 8270

The herbicides in TCLP extracts will be analyzed by USEPA Method 8270 found in SW-846. A sample will be reanalyzed if the matrix spike results are outside the limits found in this table or if the analyst feels a reanalysis is required for any other reason. If the matrix spike results are outside the QC limits on the reanalysis then these results will be attributed to matrix effect.

## METHOD 8270

## MATRIX SPIKE RECOVERY LIMITS

Laboratory  
Control Limits  
All Matrices  
(%)

2,4-D	55-114
2,4,5-TP (Silvex)	44-108

## METHOD 8240 (SW-846) Total

The Volatile Organic Compounds (VOCs) in TCLP extracts will be analyzed by USEPA Method 8240 found in SW-846. Recoveries of surrogate compounds will be run on each sample and if any are outside the laboratory's historical control limits, the sample will then be reanalyzed. The sample will also be reanalyzed if more than 1 surrogate recovery is outside the QC limits found in SW-846. If the surrogate recoveries are outside the QC limits on the reanalysis these results will be attributed to matrix effect.

SURROGATES	CMPD. #	LABORATORY		USEPA	
		CONTROL WATER (%)	LIMITS SOIL	CONTROL WATER (%)	LIMITS SOIL (%)
1,2-Dichloroethane-d4	1	80-120	75-125	76-114	70-121
Toluene-d8	2	80-120	75-125	88-110	81-117
Bromofluorobenzene (BFB)	3	80-120	75-125	86-115	74-121

## METHOD 8240

## MATRIX SPIKE RECOVERY LIMITS

Benzene	1	79-120	51-139	76-127	66-142
Chlorobenzene	2	79-120	51-139	75-130	60-133
1,1-Dichloroethene	3	79-120	51-139	61-145	59-172
Trichloroethene	4	79-120	51-139	71-120	62-137
Toluene	5	79-120	51-130	76-125	59-139

TABLE NO. 6 (Continued)

## Method 8270 (SW-846)

The Polycyclic Aromatic Hydrocarbons (PAHs) will be run by USEPA Method 8270 found in SW-846. Recoveries of surrogate compounds will be run on each sample and if any are outside the laboratory's historical control limits, the sample will then be reanalyzed. The sample will also be reanalyzed if more than 1 surrogate recovery is outside of the QC limits found in SW-846. If the surrogate recoveries are outside the QC limits on the reanalysis these results will be attributed to matrix effect.

## METHOD 8270

## SURROGATE RECOVERIES

	CMPD. #	LABORATORY CONTROL LIMITS ALL MATRICES (%)	USEPA CONTROL LIMITS WATER SOIL (%) (%)	
Base/Neutral Fraction				
Nitrobenzene-d5	1	27-134	35-114 23-120	
2-Fluorobiphenyl	2	28-128	43-116 30-115	
Terphenyl-d14	3	DL-117	33-141 18-137	
Acid Fraction				
2-Fluorophenol	1	DL-107	10-94 24-113	
Phenol-d5	2	6-112	21-100 25-121	
2,4,6-Tribromophenol	3	20-149	10-123 19-122	

## METHOD 8270

## MATRIX SPIKE RECOVERY LIMITS

	CMPD. #	LABORATORY CONTROL LIMITS SOIL MATRIX (%)	USEPA CONTROL LIMITS WATER SOIL (%) (%)
Base/Neutral Fraction			
Acenaphthene	1	18-110	46-118
Pyrene	2	28-133	26-127

NOTE: For spike concentrations 2-5 times the sample concentration.

TABLE NO. 6 (Continued)

## QUALITY CONTROL LIMITS FOR METAL AND OTHER INORGANIC ANALYSES

All metal analyses will be rerun if either the matrix spike results or the duplicate results fall outside of the US EPA limits in this table or if the analyst feels a reanalysis is required for any other reason. In other analyses where specific US EPA guidelines are unavailable the laboratory will use its internal control limits to determine when a reanalysis is required.

METAL ANALYSES AND SW-846 METHOD REFERENCE	SPIKE RECOVERIES		DUPLICATE ANALYSES	
	INTERNAL CONTROL LIMITS % REC.	US EPA CONTROL LIMITS % REC.	INTERNAL CONTROL LIMITS % RPD	US EPA CONTROL LIMITS % RPD
Total Arsenic by 7060	71-130	75-125	0-35 %	0-25 %
Total Barium by 6010				
Total Cadmium by 6010	72-120	75-125	0-67 %	0-25 %
Total Chromium by 6010	81-101	75-125	0-36 %	0-25 %
Total Lead by 7421	81-118	75-125	0-25 %	0-25 %
Total Mercury by 7471	77-131	75-125	0-40%	0-25%
Total Selenium by 7740				
Total Silver by 6010				
Total Zinc by 6010	70-112	75-125	0-11 %	0-25 %
MISC. TESTS AND METHOD REFERENCES	SPIKE RECOVERIES		DUPLICATE ANALYSES	
	INTERNAL CONTROL LIMITS % REC.	USEPA CONTROL LIMITS % REC.	INTERNAL CONTROL LIMITS % RPD	USEPA CONTROL LIMITS % RPD
Reactive Cyanide	70-130	75-125	0-20	0-20
Flashpoint (Closed Cup)	N/A	N/A	0-5°C	
Sulfide, Reactive				
Corrosivity	N/A	N/A	N/A	N/A
TPH				0-100



TABLE NO. 6 (Continued)

## CONTROL CHARTS FOR METAL SPIKE RECOVERIES FROM TCLP BLANKS

SPIKE RECOVERIES (%)										
ALL METALS EXCEPT HG ARE ANALYZED USING SIMULTANEOUS ICAP										
USEPA LIMITS: FOR ALL METALS 50-150% OR AVG. +/- 3 STD.										
DATE REPORTED	ATEC NUMBER	AS	BA	CD	CR	PB	HG	SE	AG	AVG.
07/03/91	11468	80	83	86	82	80	100	84	115	90.0
07/09/91	11668	91	96	91	87	89	95	96	89	91.9
07/11/91	11843	103	94	82	97	99	90	107	87	93.7
07/19/91	12088	91	105	87	97	105	95	100	87	96.6
07/19/91	12183	105	94	92	97	98	110	68	87	92.3
07/19/91	12482	114	93	92	98	98	100	129	87	98.3
07/30/91	12891	96	83	85	88	90	90	97	82	87.9
07/31/91	13402	81	85	94	91	86	95	78	91	88.6
08/06/91	13176	92	101	97	98	99	105	101	87	98.3
08/08/91	13374	104	100	102	99	104	105	111	95	102.3
08/09/91	13623	103	102	110	98	101	120	111	89	104.4
08/13/91	13671	93	90	91	88	95	110	95	89	94.0
08/13/91	13800	98	93	95	90	98	95	98	83	93.1
08/16/91	14081	102	96	96	101	101	115	106	93	101.1
08/20/91	14219	99	93	93	89	98	1015	103	95	96.6
08/23/91	14329	102	101	100	97	107	105	102	95	101.0
08/28/91	14403	96	101	97	94	94	119	98	92	99.3
08/28/91	14462	99	100	96	95	95	110	102	91	98.4
09/04/91	14715	101	105	103	99	98	125	106	90	103.7
09/05/91	14847	96	102	104	100	99	100	103	93	100.1
09/09/91	15286	104	102	99	95	93	110	109	105	101.9
09/10/91	15287	103	98	101	97	94	100	107	108	100.7
09/13/91	15572	95	89	91	89	89	110	94	91	93.3
09/17/91	15807	105	92	93	95	92	120	104	100	99.4
09/20/91	15920	104	95	100	97	99	110	112	85	99.7
Average		98.3	95.7	95.1	94.3	96.0	105.6	10.5	92.2	97.1
STD.		7.4	6.2	6.4	4.8	6.0	9.5	10.8	7.6	4.6
Upper C.L.		120.5	114.5	114.2	108.7	114.0	133.9	133.0	115.0	110.9
Lower C.L.		76.1	77.0	75.9	79.9	78.1	77.2	68.0	69.5	83.2

#### 4.0 Field Sampling Plan

##### 4.1 Site Background

Site background information as well as purpose and scope have been identified in Section No. 1.

##### 4.2 Sampling Objectives

Field data gathered as part of the Consent Decree will be used to develop and compile a Sediment Removal and Disposal Plan (SRDP). The SRDP will identify remedial alternatives for the study section of the FLUME. Three major uses for this data are:

- Identification of the horizontal and vertical extent of contaminated sediments
- Determination of remedial options
- Evaluation of disposal options

##### 4.3 Sampling Location and Frequency

###### 4.3.1 Sample Matrices

The main sample matrix as identified under the Consent Decree will be FLUME sediment. In conjunction with the acquisition of FLUME sediment samples, ambient air will be monitored to determine the level of personal safety equipment required for field personnel.

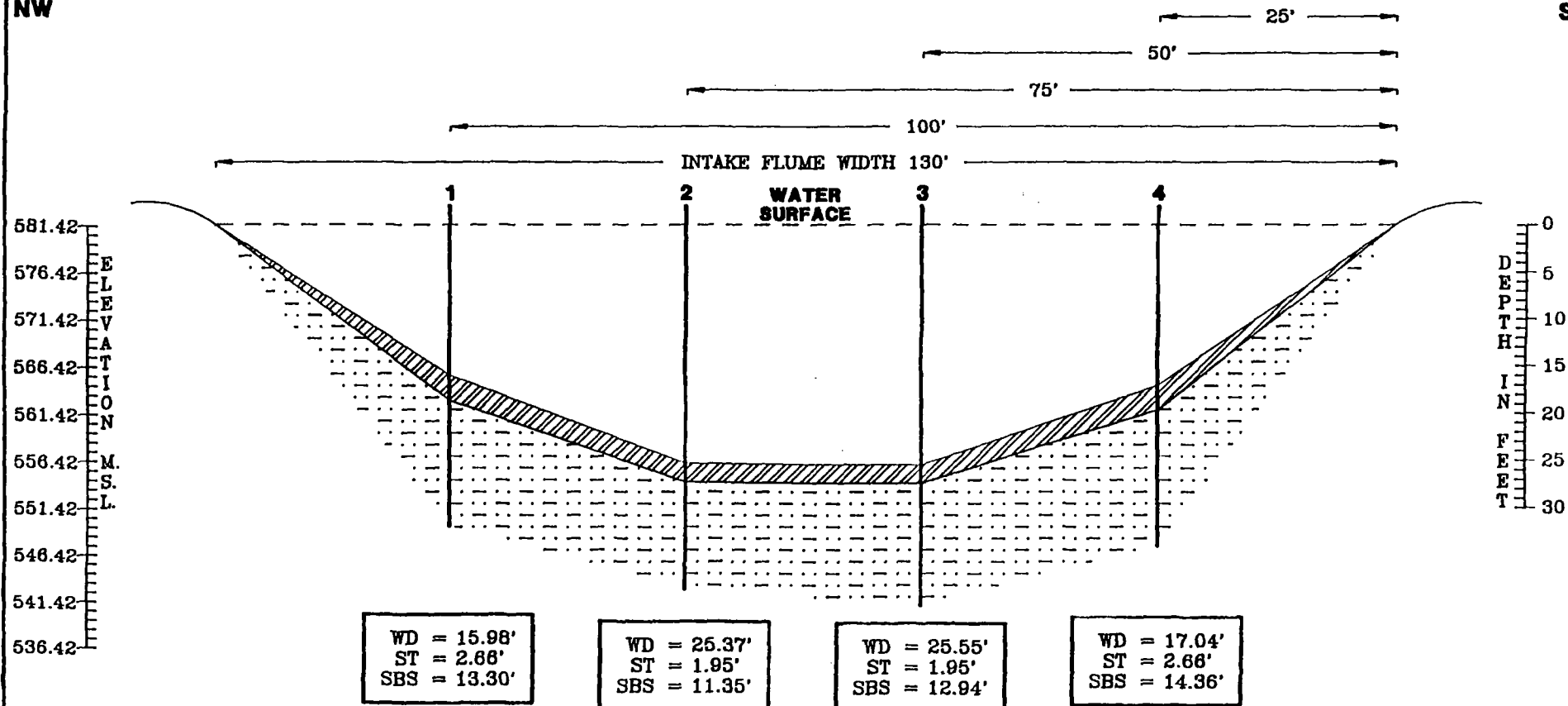
###### 4.3.2 Sample Location

As identified in the Consent Decree, the data profiles will be obtained at intervals of every 200 feet along the length of the FLUME (See Plate 3). Each profile cross-section will be developed by measuring, at four equal distant locations across the width of the FLUME, the depth of the water, the depth of the sediment, and the depth of any slag fill down to the original lake bottom or to refusal.

The data for each profile cross-section will be graphically illustrated as shown in Figure No. 5. Total volume will be calculated based on the estimated area of each profile and the distance between adjacent profiles.

NW

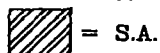
SE



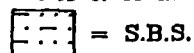
PROJECT NO. 9083-01

## LEGEND

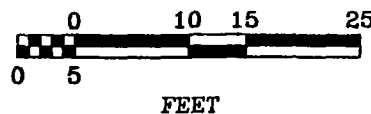
S.A. = SLUDGE AREA = 230.52 sq. ft.  
 S.B.S. = SEDIMENT PENETRATED BELOW SLUDGE  
 S.T. = SLUDGE THICKNESS  
 W.D. = WATER DEPTH  
 ELEVATION M.S.L. = ELEVATION MEAN SEA LEVEL



= S.A.



= S.B.S.



LTV STEEL COMPANY  
 EAST CHICAGO, INDIANA  
**CROSS-SECTION OF INTAKE  
 FLUME PROFILE EXAMPLE**  
 FLOYD BROWNE ASSOCIATES, INC.  
 HYDROGEOLOGICAL SERVICES  
 MARION, OHIO  
 FIGURE NO. 5

#### 4.3.3 Sample Frequency

Sample frequency at each profile has been identified under the Consent Decree. Every third profile section (i.e., 600 feet) will have four sampling points (See Plate 3). At every third profile, the first and second sediment core samples and the third and fourth sediment core samples will be composited for analysis. Per each sample obtained, only the sediment portion of the core will be analyzed.

Proposed numbers of samples and quantity of field replicates (co-located or duplicates) are presented in Table No. 7.

#### 4.4 Sample Designation

All samples collected during the implementation phase of the SCS for either physical or chemical analyses will be assigned a specific and unique sample number. As suggested by Tsai (1989), each sample number will consist of various codes.

The sample number will consist of the following codes:

xx-yyzw###-##

where xx = IF (Intake FLUME)

yy = SD (Sediment)

z = P (Profile)

w = y (yes a QA/QC sample)  
n (No, not a QA/QC sample)

### = Profile number must be three digits  
012 for Profile 12

fourth # = 0 general sample  
1 TCLP sample

fifth # = 1 for northwestern cores composite  
2 for southeastern cores composite

#### 4.5 Sampling Equipment and Procedures

##### 4.5.1 Sampling Equipment

Field equipment needed for data acquisition, description and packaging is presented in Table No. 8. Other equipment may be necessary following initiation of the study.

**TABLE NO. 7**  
**SUMMARY TABLE OF SAMPLING AND ANALYSIS PROGRAM**

SAMPLE MATRIX	FIELD PARAMETERS	LABORATORY PARAMETERS	MATRIX TOTAL	INVESTIGATIVE SAMPLES			FIELD QUALITY CONTROL SAMPLES					
							CO-LOCATED			REPLICATED		
				#	FREQ	TOTAL	#	FREQ	TOTAL	#	FREQ	TOTAL
FLUME SEDIMENTS	SOIL CLASS MicroTIP PID	ARSENIC	16	12	1	12	2	.15	2	2	.15	2
		CADMIUM	16	12	1	12	2	.15	2	2	.15	2
		T.CHROMIUM	16	12	1	12	2	.15	2	2	.15	2
		LEAD	16	12	1	12	2	.15	2	2	.15	2
		ZINC	16	12	1	12	2	.15	2	2	.15	2
		REACTIVE CYANIDE	16	12	1	12	2	.15	2	2	.15	2
		REACTIVE SULFIDE	16	12	1	12	2	.15	2	2	.15	2
		FLASHPOINT	16	12	1	12	2	.15	2	2	.15	2
		PAH'S	16	12	1	12	2	.15	2	2	.15	2
		PCB'S	16	12	1	12	2	.15	2	2	.15	2
		TCLP	16	12	1	12	2	.15	2	2	.15	2
		TPH	16	12	1	12	2	.15	2	2	.15	2
		CORROSIVITY	16	12	1	12	2	.15	2	2	.15	2



TABLE NO. 8  
FIELD EQUIPMENT

BOATS

2-30' PONTOON BOATS  
1-16' JOHN BOAT

BOAT SAFETY EQUIP.

1 TYPE IV PFD/BOAT  
1 TYPE I, II, OR III PFD/PERSON  
FIRE EXTINGUISHERS-30'-2B-I OR 1-B-II  
OTHERS 1-B-I  
FLAME ARRESTERS ON GAS ENGINES

VIBRA-CORE

VIBRA-CORE UNIT  
TRIPOD  
TRIPOD EXTENSION BAR  
HANDLES -- 2 SETS  
2 TON COME-ALONG -- 2  
WRENCHES TO FIT MOUNTING HEAD & HANDLES  
POUNDING WEIGHT  
PISTONS  
PISTON CHAINS

SAMPLING (~ 16 SAMPLES)

4-16 OZ. JAR/TEFLON LIDS/SAMPLE  
1 ALUMINUM TUBE/SAMPLE  
COOLERS  
PEANUTS (STYROFOAM) OR BUBBLE PACK

MISC.

2 CIRCULAR SAWS  
12 BLADES 8" FOR ALUMINUM  
2 HACK SAWS  
12 BLADES FOR ALUMINUM  
2 100' TAPES

PERSONAL SAFETY EQUIP.

GLOVES  
TYVEK SUITS  
SAFETY GLASSES  
PERSONAL RESPIRATORS  
RUBBER OUTERBOOTS

PHOTOGRAPHIC EQUIP.

VHS CAMCORDER  
35 MM CAMERA  
8 X 10 DRY ERASE BOARD W/MARKERS

FIELD MEASURING EQUIP.

MICROTIP PID PLUS/ACCESS.  
4 SP. BATT. & CHARGERS

TABLE NO. 8 (Continued)  
FIELD EQUIPMENT

PAPER WORK

CHAIN-OF-CUSTODY FORMS  
SED. DESCRIP. FORMS  
FIELD NOTEBOOKS

FIELD OFFICE

PORTABLE COMPUTER  
FOR DOWNLOADING  
MICROTIP  
FAX  
COPIER

## 4.5.2 Sampling Procedures

### 4.5.2.1 Sample Location Selection

Sample locations and selection criteria have been described under Section 4.3.2.

### 4.5.2.2 Sample Acquisition Procedures

Data/Sample Acquisition Procedures on the FLUME will be obtained in a two part approach i.e., profile identification and data acquisition.

#### 4.5.2.2.1 Profile Identification

The Field Investigation Team (FIT) will mark off profile spacings as described in Section 4.3.2. Each profile location will be identified using a line counter measuring device. For each profile identified, the FIT will vibracore a two inch ID steel anchor pipe approximately 10 to 15 feet into both sides of the FLUME at the water/bank interface.

After each profile has been identified, a survey will be conducted and the elevations recorded using the northwestern bank anchor post as the elevation reference. Water elevations will then be measured and locations marked with labels identifying the profile numbers.

#### 4.5.2.2.2 Data Acquisition

The objectives of the data acquisition are to obtain sediment thickness data and analytical samples, and describe, photograph and package sediment samples for shipment to the laboratory for analysis.

Data acquisition pertaining to the width of the FLUME, elevation of current water level, depth of the water and depth of core penetration will be conducted on the FLUME using 30 foot pontoon boat(s). The cores will then be transported to the sampling station, located at the No. 2 Pump Station, where sediment description extraction and containerization will take place. See Plate 1 for the location of the sampling station. In addition, sample packaging and shipment including all necessary documentation will be performed at the sampling station.

Upon arrival at a profile location, the FLUME width will be measured and recorded. The sample acquisition, handling and supply boats will be lashed together and attached to the anchor cable to prevent drifting. Once the determination of width has been accomplished, the FIT will utilize the coring scheme as described in section 4.3.2.

The core tube will be set on bottom and the depth of water will be recorded. Core samples will be installed using a vibracore device attached to a three inch I.D. aluminum pipe. The core will then be advanced and the sediment thickness will be recorded. The core will then be extracted from the bottom using a one and three quarter ton chain lift.

Following removal from the bottom, the core will be cleaned off, the ends sealed with Shelby tube caps and taped securely closed. The following information will be written in permanent ink on the outside:

- o Profile number
- o Sample location, either first, second, third, or fourth core location on the profile as measured from the northwestern bank
- o Top indicating arrow
- o Date
- o Time

The core will then be transferred to the designated sampling location at the No. 2 Pump House, (See Plate 1).

Following transferral from the acquisition team, the core will be wiped free of loose debris and cut lengthwise with a power saw. The power saw blade will be set to a depth that will just cut through the aluminum tube and cause minimal disturbance of the sediment inside the tube. The core tube will then be rotated and the opposite side will be cut. The core tube will then be opened and the recovery will be measured.

The cores will then be sampled for analytical work. As set forth in Section 4.3.3, sediment from cores one and two will be composited and sediment from cores three and four will be composited. For relatively fluid samples one half of the sample jars will be filled with sediment from the appropriate cores. For relatively solid samples, after the sample has been collected it will be mixed thoroughly with a spatula inside the jar. Chain-of-custody seals will be filled out and affixed to the jars at this time.

Sediment description will then proceed. Both halves will be laid side by side and photographed. Distinctly different layers (i.e. contacts between two different colored layers or textures) will be photographed separately. Each photograph will include:

- o Profile number
- o Date

- o Top or bottom of core label
- o Scale

A sediment description form is shown on Figure No. 6.

The remaining sediment including the slag portion of the recovery, will be placed in containers and stored in an appropriate location.

#### Decontamination of Equipment

FIT members who handle the sediments will be wearing disposable vinyl gloves which will be changed between cores. All wash and rinse fluids will be collected in appropriate containers for proper disposal onshore.

Equipment such as knives, measuring tapes, etc. will be decontaminated by washing in a Liquinox or Alconox soap solution, rinsing twice in potable water, rinsing with hexane and a final rinse of distilled/deionized water.

#### 4.5.2.3 QA Sample Acquisition

##### 4.5.2.3.1 Co-located Samples

Two co-located samples will be collected. These samples will be obtained by vibracoring downstream offsets of two randomly selected sampling profiles and compositing one randomly selected horizon from each profile.

##### 4.5.2.3.2 Field Duplicate (Replicate) Samples

Two field duplicate samples will be collected. These samples will be obtained by filling an additional set of laboratory containers from two randomly selected sample locations.

#### 4.5.3 Sample Package and Shipment

##### 4.5.3.1 Packaging of Samples

Procedures for the packaging of samples will be as follows:

- a.) Each sample will be securely wrapped with plastic bubble pack.
- b.) Samples from each day will be placed in an insulated cooler.
- c.) Each cooler will be packed with suitable packing materials and ice in order to maintain a temperature of approximately 4 degrees centigrade.
- d.) A chain of custody record sealed in plastic will be placed in each cooler for laboratory identification of samples.



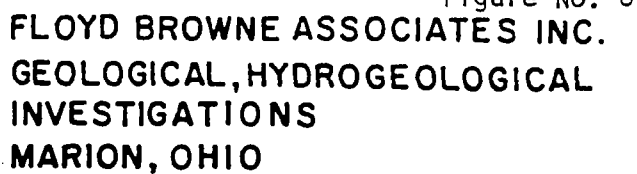


Figure No. 6

Form EE-5  
4.14.87

e.) Each cooler will be securely sealed with a durable adhesive tape and chain-of-custody seals.

f.) Each cooler will then be properly labeled for shipment.

#### 4.5.3.2 Shipment of Samples

All samples collected each day will be shipped to the laboratory on Wednesday and Friday evenings.

#### 4.6 Sample Handling and Analysis

A summary of the required sample preservation methods, types and number of sampling jars, and holding times for the required analyses is given in Table 9.

**TABLE NO. 9**  
**SAMPLE PRESERVATIVES AND CONTAINERS**

Parameter	Matrix	Volume	Container	Preservative	Maximum Holding Time
PCB's Method 8080	Soil	1 X 16 oz.	G,Teflon Cap	4 C	14 days extract/40 days analysis
PAH's Method 8270	Soil	Analyzed	from PCB Sample	4 C	14 days extract/40 days analysis
Metals	Soil	1 X 16 oz.	G,Teflon Cap	4 C	6 months
Reactive Cyanide 9012	Soil	Analyzed	from Metals Sample	4 C	14 days extract/40 days analysis
Reactive Sulfide 9030	Soil	Analyzed	from Metals Sample	4 C	7 days extract/40 days analysis
Flashpoint 1020 (Open Cup)	Soil	Analyzed	from Metals Sample	4 C	7 days
TCLP 1311	Soil	2 X 16 OZ.	G, Teflon Cap	4 C	28 days extract/40 days analysis
TPH	Soil	Analyzed	from Metals Sample	4 C	

**Samples of Roll Shop Wastes with Chromium Concentrations Above 5mg/L**

**LTV Steel Company  
East Chicago, Indiana**

**Date Collected      Concentrations (mg/L)      Type of Sample      Source      Test Method      Lab**

12/6/89	12	Comp.	Roll Shop	EP	NET
12/19/89	7	Comp.	Roll Shop	EP	NET
2/11/91	7.5		#3 SM	EP	ATEC
5/20/93	9.9	Grab	#2 TM	TCLP	Heritage
11/18/93	7.0	Grab	84" HSM	TCLP	Heritage
9/13/96	7.9		#2 TM	TCLP	ECL
5/10/96	5.4		#2 TM	TCLP	ECL
9/17/96	21.8/BDL	Comp.	84" HSM	TCLP	NEIC/ECL
9/17/96	11.3/BDL*	Comp.	84" HSM	TCLP	NEIC/ECL
9/17/96	5.55/3.6	Comp.	#3 SM	TCLP	NEIC/ECL
9/18/96	14.33/3.3	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	7.66/.3	Comp.	#2 TM	TCLP	NEIC/ECL
3/14/97	5.9		#2 TM	TCLP	ECL

---

\* Sample may not be representative.

**Total Samples of Roll Shop Waste Analyzed for Chromium**

**LTV Steel Company  
East Chicago, Indiana**

**Sampling Date      Concentrations (mg/L)      Type of Sample      Source      Test Method      Lab**

12/6/89	12	Comp.	Roll Shop	EP	NET
12/12/89	2.2	Comp.	Roll Shop	EP	NET
12/19/89	7.0	Comp.	Roll Shop	EP	NET
4/4/91	1.5		84" HSM	EP	Quality
4/4/91	0.3		#3 SM	EP	Quality
4/4/91	4.2		#2 TM	EP	Quality
3/25/91	< 0.04		84" HSM	EP	NET
3/25/91	0.61		#2 TM	EP	NET
3/25/91	1.5		#3 SM	EP	NET
2/11/91	7.5		#3 SM	EP	ATEC
2/11/91	2.2		84" HSM	EP	ATEC
2/11/91	< 0.5		#2 TM	EP	ATEC
5/17/91	.38		Roll Shop	TCLP	ATEC
10/10/91	1.3		Roll Shop	TCLP	ATEC
4/8/92	1.5		Roll Shop	TCLP	EMS Heritage



<u>Sampling Date</u>	<u>Concentrations (mg/L)</u>	<u>Type of Sample</u>	<u>Source</u>	<u>Test Method</u>	<u>Lab</u>
9/23/92	.16	Roll Shop	Roll Shop	TCLP	EMS Heritage
5/20/93	BDL	Grab	84" HSM	TCLP	EMS Heritage
5/20/93	9.9	Grab	#2 TM	TCLP	EMS Heritage
5/19/93	4.6	Grab	#3 SM	TCLP	EMS Heritage
11/18/93	2.7	Grab	#2 TM	TCLP	EMS Heritage
11/18/93	1.9	Grab	#3 SM	TCLP	EMS Heritage
11/18/93	7.0	Grab	84" HSM	TCLP	EMS Heritage
8/30/94	3.5	Comp.	#2 TM	TCLP	ECL
9/13/94	1.5	Comp.	#3 SM	TCLP	ECL
9/13/94	BDL		84" HSM	TCLP	ECL
3/15/95	0.2	Comp.	#3 SM	TCLP	ECL
3/15/95	BDL	Comp.	84" HSM	TCLP	ECL
3/16/95	0.7	Comp.	#2 TM	TCLP	ECL
9/13/95	BDL		84" HSM	TCLP	ECL
9/13/95	0.2		#3 SM	TCLP	ECL
9/13/95	0.4	Comp.	#2 TM	TCLP	ECL
9/12/96	1.2	Grab	#3 SM	TCLP	ECL

<u>Sampling Date</u>	<u>Concentrations (mg/L)</u>	<u>Type of Sample</u>	<u>Source</u>	<u>Test Method</u>	<u>Lab</u>
9/12/96	BDL	Grab	84" HSM	TCLP	ECL
9/13/96	BDL	Grab	#2 TM	TCLP	ECL
3/14/96	0.4	Comp.	#2 TM	TCLP	ECL
3/13/96	BDL	Comp.	84" HSM	TCLP	ECL
3/13/96	1.7	Comp.	#3 SM	TCLP	ECL
9/13/96	0.5		#2 TM	TCLP	ECL
9/13/96	BDL		#2 TM	TCLP	ECL
9/13/96	7.9	Grab	#2 TM	TCLP	ECL
5/10/96	5.4		#2 TM	TCLP	ECL
9/18/96	ND/BDL	Comp.	#2 TM	TCLP	NEIC/ECL
9/17/96	21.8/BDL	Comp.	84" HSM	TCLP	NEIC/ECL
9/17/96	4.7/BDL	Comp.	84" HSM	TCLP	NEIC/ECL
9/17/96	11.3/BDL*	Comp.	84" HSM	TCLP	NEIC/ECL
9/17/96	5.55/3.6	Comp.	#3 SM	TCLP	NEIC/ECL
9/17/96	4.5/2.9	Comp.	#3 SM	TCLP	NEIC/ECL
9/17/96	4.05/2.6	Comp.	#3 SM	TCLP	NEIC/ECL

\* Sample may not be representative.

<u>Sampling Date</u>	<u>Concentrations (mg/L)</u>	<u>Type of Sample</u>	<u>Source</u>	<u>Test Method</u>	<u>Lab</u>
9/18/96	4.74/BDL	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	14.33/3.3	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	3.39/BDL	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	1.28/BDL	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	7.66/.3	Comp.	#2 TM	TCLP	NEIC/ECL
9/18/96	ND/BDL	Comp.	#2 TM	TCLP	ECL
9/19/97	BDL	Grab	#2 TM	TCLP	ECL
9/19/97	BDL	Grab	#2 TM	TCLP	ECL
9/19/97	BDL	Grab	#2 TM	TCLP	ECL
9/19/97	1.1	Grab	#2 TM	TCLP	ECL
9/18/97	3.7	Comp.	84" HSM	TCLP	ECL
9/18/97	0.2	Comp.	#3 SM	TCLP	ECL
3/13/97	4.3		#3 SM	TCLP	ECL
3/13/97	1.9		84" HSM	TCLP	ECL
3/14/97	1.3		#2 TM	TCLP	ECL
3/14/97	5.9		#2 TM	TCLP	ECL
3/14/97	BDL		#2 TM	TCLP	ECL

<u>Sampling Date</u>	<u>Concentrations (mg/L)</u>	<u>Type of Sample</u>	<u>Source</u>	<u>Test Method</u>	<u>Lab</u>
4/9/98	BDL	Grab	#2 TM	TCLP	ECL
4/9/98	BDL	Grab	#2 TM	TCLP	ECL
4/9/98	0.1	Comp.	#2 TM	TCLP	ECL
4/9/98	0.2	Comp.	84" HSM	TCLP	ECL
4/8/98	0.1	Comp.	#3 SM	TCLP	ECL